December 9, 1935

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

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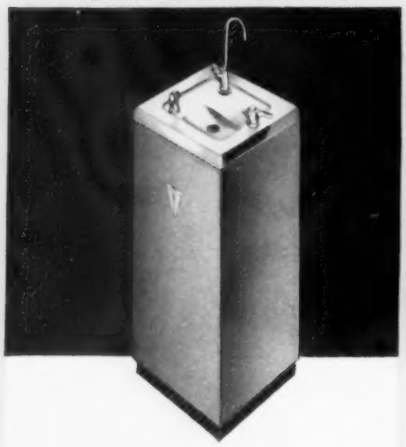

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STEEL

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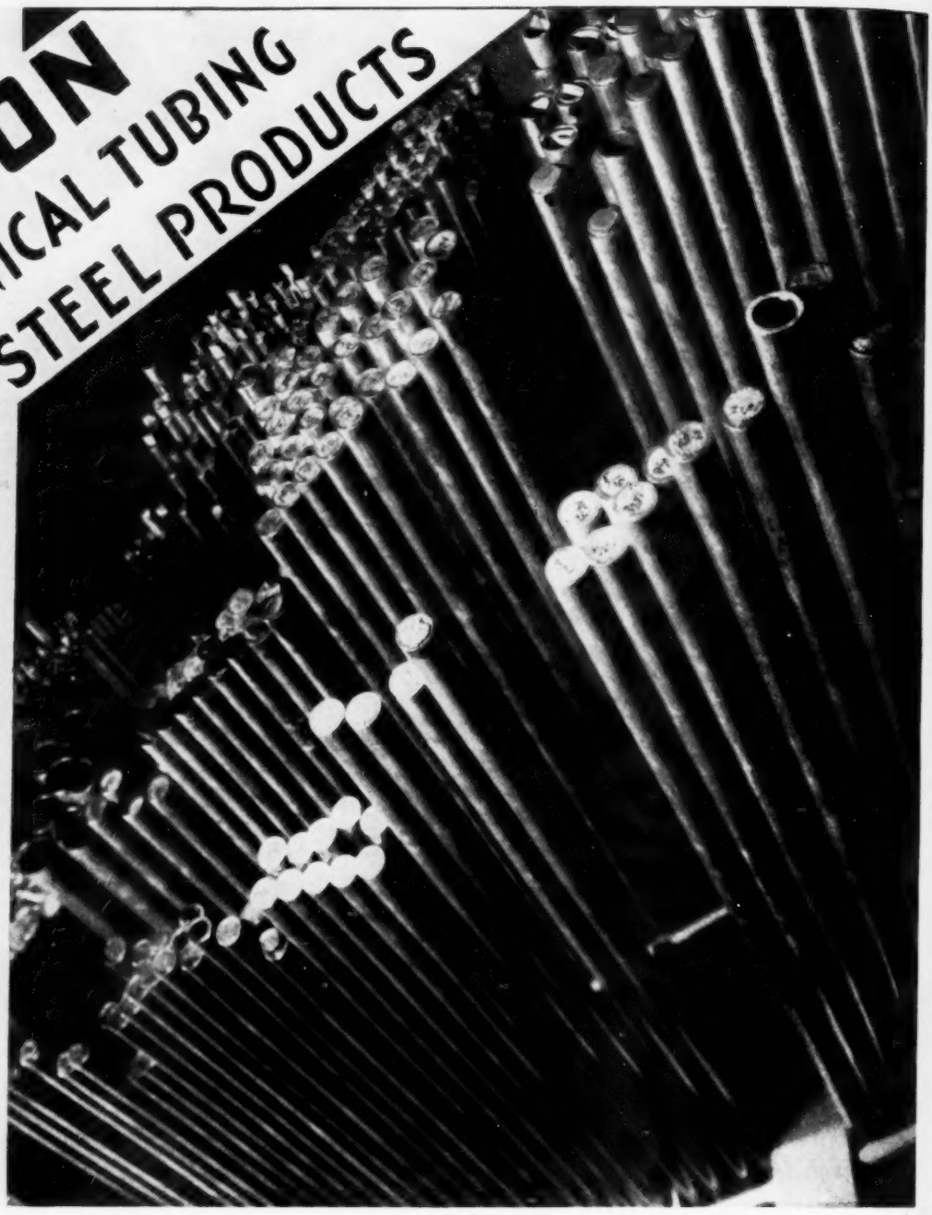

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As the Editor Views the News

ACTIVITY throughout the metalworking industries generally now is at a higher rate than in the corresponding period of 1929. The recent rise and spread of the recovery movement and the underlying strength of the present situation make it reasonable to expect that current figures will continue to compare favorably with corresponding statistics for 1929 until the end of the year. However, busines must expand considerably in the first and second quarters of 1936 (p. 30) if it is to match or surpass the volume of the early months of 1930. Parity with the peaks of the pre-crash period of 1929 still is a long way off.

• • •

Outlook for 1936 Is Bright

Iron and steel production, which dropped more than general industrial activity during the acute period of the depression, is regaining ground steadily. The outputs of pig iron (p. 22) and of steel ingots (p. 21) in November, 1935, were the highest for any November since 1929. Automobile production, at more than 90,000 units weekly (p. 24), is running at about three times the output in the corresponding 1929 weeks. The realization that business in the metalworking industries is as good as it is—in spite of lame support from the building and heavy construction fields—makes for substantial optimism in the short-term outlook for 1936.

• • •

Sanity Is Coming Back

Continuing favorable business conditions will exert much influence upon the trend of government policy in 1936. A busy nation always pays little heed to the call for reckless experiment. Sanity usually returns with improved business, and for this reason the sponsors of impractical ideas will encounter more opposition next year than they did in 1933 or 1934. The tide of public opinion is turning and in the process it is likely to swing toward the assurances of substantial benefits resulting from business prosperity and away from the political promises of manna from the government. It will be interesting to watch the effect of improved business and more evenly distributed employment upon Townsendites and others who want something for nothing, and upon professional labor organizers who want to make membership in a union mandatory for every man who works for wages.

• • •

Steel for Small or Big Homes

The greatest opportunities for steel in house construction are said to lie in the field of small residences—homes for families in the low-income brackets. Those who have studied the market believe that the bulk of the potential tonnage lies in houses which will require from three to five tons each. It is a far cry from a house of this size to the pretentious home being erected in the suburbs of Toledo (p. 17), in which 45 tons of steel is being used. However, while this large residence is not typical, it embodies numerous features which will interest architects, builders and suppliers of materials who are devoting their attention to smaller structures. For instance, more steel by weight is used in the floors than in the walls.

• • •

U. S. Designs for U. S. S. R.

When American engineers undertake to design a complete, modern steel mill unit for foreign installation, they encounter situations quite different from those which attend a domestic job. This is true in the case of a sheet mill plant designed by a Pittsburgh engineering and equipment company for the Soviet government. All designs and drawings (p. 32) are being made in the United States, but a substantial part of the actual equipment will be built in U. S. S. R. The metric system is used in all design details, and of course the mill will be operated under that system. American steel mill executives, studying the appointments of this newest Soviet mill, will find everything—and more—that is considered the last word in modern rolling mill equipment.

E. L. Shaner

Embargo on War Exports of Steel, Scrap Awaits Congress

WASHINGTON

TALK of embargoes on war materiel for the Italo-Ethiopian conflict was renewed last week following the effective date of the provision of the neutrality act compelling manufacturers of arms, munitions, and implements of war to register with the national munitions control board, Washington. Several important producers of steel registered.

A report that the state department has decided that it cannot place a ban on shipments of steel and iron and steel scrap, among other materiel, is denied by the department. However, there is a general feeling in the capital that such a ban cannot and will not be ordered prior to new legislation. The present act expires Feb. 29, and one of the first actions of the coming session of congress will deal with neutrality—provided, of course, the war continues.

Favor Tightening Restrictions

Senator Norris, of Nebraska, feels that congress should extend provisions of the act to outlaw shipments of all war materiel to belligerents, and by this he means steel, cotton, oil and other products. Senator Bone, of Washington, a member of the munitions committee, is also for drastic tightening of the act, which he terms inadequate.

For the present, the efforts of the administration are devoted to the use of persuasion to restrict shipments of materiel to "normal" or peacetime averages. It is increasingly evident, however, that in case the war persists and congress legislates, it will either place a definite embargo on steel, scrap and kindred material or will give the President a broad blanket of authority to do so.

Among 86 companies which have registered under the neutrality act as manufacturers of arms, munitions or implements of war are the following:

Aerial Machine & Tool Corp., New York; Bethlehem Shipbuilding Corp. Ltd., Quincy, Mass.; Bethlehem Steel Co., Bethlehem, Pa.; Carnegie-Illinois Steel Corp., Pittsburgh; Chrysler Corp., Detroit; Fay-Egan Mfg. Co., Cincinnati; Federal Shipbuilding & Dry Dock Co., Kearny, N. J.; Harrisburg Steel Corp., Harrisburg, Pa.; National Tube Co., Pittsburgh; Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; New York Shipbuilding Corp., Camden, N. J.; Pennsylvania Forge Corp., Philadelphia; Pittsburgh Screw & Bolt Corp., Pittsburgh; Winchester Repeating Arms Co., New Haven, Conn., and practically all manufacturers of aircraft.

New Capacity

AMERICAN STEEL & WIRE CO. will build two continuous-type rod mills at Joliet, Ill., starting work within 30 to 60 days, and planning to have them in operation by November, 1936. Each will be of 220,000 tons capacity. Mills will cost a total of $3,000,000. Some of the present plant will be dismantled, and the rod mills housed in a structure about 500 feet long.

ORDERS HEATING FURNACE

Youngstown Sheet & Tube Co., Youngstown, O., has awarded to the Surface Combustion Corp., Toledo, O., a contract for a third slab heating furnace for its continuous wide hot strip mill. This furnace is expected to increase capacity of the hot mill about 25 per cent, to 65,000 tons monthly.

BOOKS AUSTRALIAN MILL

Mackintosh-Hemphill Co., Pittsburgh, has booked for John Lysaght Ltd., Newcastle, New South Wales, Australia, sheet steel making equipment costing $100,000.

Labor

IN OCTOBER, employment in the steel industry rose to 436,554 persons, an increase of 226,000 over the low point of autumn 1932. The October showing was a slight gain over the 429,217 employed in September, and a substantial increase over the 381,431 of last October.

Total payrolls of $51,456,368 in October compare with $45,892,839 in September, and $32,723,909 in October, 1934.

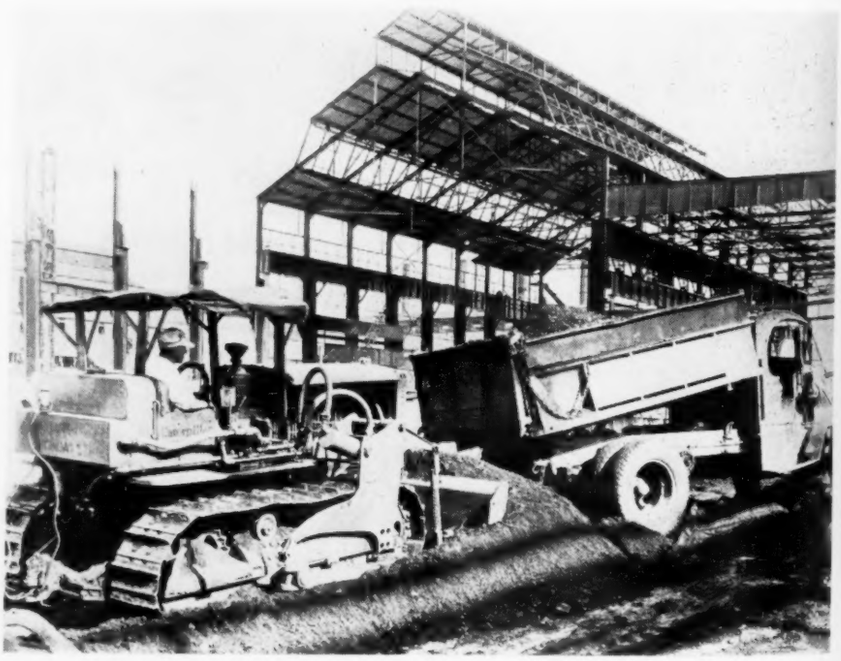
Average hours per week in October were 36.8, against 34 in September, and 25.4 last October.

Average hourly earnings of wage earners were 65.4 cents in October, 65.3 cents in September, and 64 cents in October, 1934, according to the American Iron and Steel institute.

UNEMPLOYMENT EASES

National Industrial Conference board, New York, reports unem-

More Steelmaking Capacity for Detroit



A view of the mill building extension at the Great Lakes Steel Corp. plant in Detroit, where a wide continuous strip mill is being installed and several more open-hearth steel furnaces may be added. A Caterpillar tractor is shown at work, moving earth at the rate of 55,000 yards a month

ployed in October at 9,196,000 in October, compared with 9,432,000 in September, and 10,057,000 in October, 1934. Every classification except transportation showed a reduction.

ALUMINUM CO. RAISES WAGES

Aluminum Co. of America, Pittsburgh, has increased wages 3 cents per hour, or an average of 5 per cent, swelling its annual payroll about $1,000,000. This increase for 15,000 workers in all plants is effective immediately.

FALK INSURES EMPLOYES

Falk Corp., Milwaukee, has covered its 900 employes with life and accident insurance and sickness benefits.

Wheeling Claims Record In Hot Strip Production

What is claimed to be a record production of hot strip steel in a 24-hour period recently was established at the Steubenville, O., division of the Wheeling Steel Corp. During the three turns on Nov. 30, the 60-inch continuous hot strip mill rolled 2782 tons and at the same time set a new hourly record of 229 tons. The former record at this plant was made Jan. 24, 1934, when 2200 tons of wide strip was put through the mill in 24 hours. Prior to this the record for the production of wide strip was held by the Otis Steel Co., Cleveland, where on Jan. 17, 1934, 1800 tons of 62-inch wide strip was handled over the hot bed, or through the coilers.

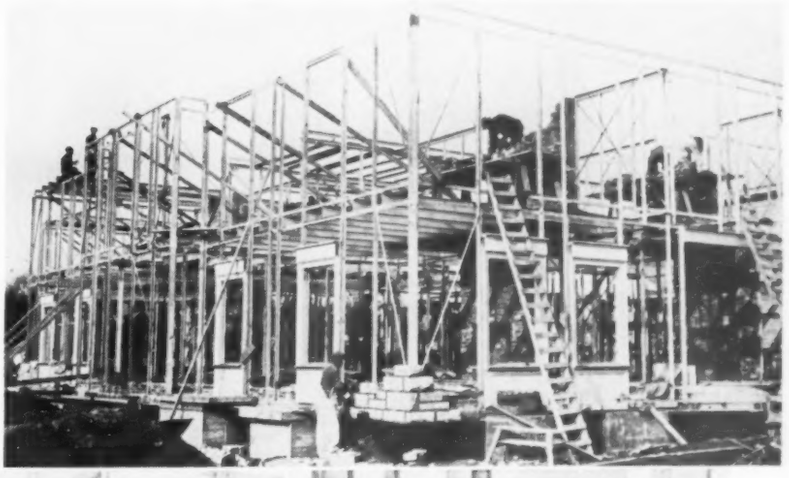
Forty-Five Tons of Steel Used in Building This House

"HEARTHSTONE," a house of unusual size now under construction in Ottawa Hills, O., near Toledo, employs what is believed to be the largest welded steel frame ever used in a residence. Walls and floor together use a total of 45 tons of steel.

Architecturally the house is of Georgian style with a richly textured stone veneer in pleasing contrast with the white wood trim and entrance motif. A stone parapet is backed with a low sloping roof of dark slate. The plan is L-shaped, each arm of which is over 100 feet in length.

The home is luxuriously complete in its planning. The basement includes a motion picture room and recreation room in addition to the usual heating, laundry and drying facilities. The first floor has a large solarium, a living room and dining room, each 19 x 29 feet, a library, morning room, large stair hall, kitchen and several rooms for servants.

The second floor comprises another large solarium, four large bedrooms with private baths, a fern room, an upstairs kitchen and service room, in addition to servants quarters. The third floor contains



MOST of the 45 tons of steel used in construction of this house is going into frames, as shown in the upper view. Above: Ribbed metal lath on top of floor beams ready to receive concrete slabs. The lath acts as concrete form and concrete reinforcement. Right: Detail of air-conditioning duct in place. All girt angles supporting floor steel are placed on the interior of the wall studs to permit uninterrupted passage of all air ducts, pipes and conduit. Diagonal bracing angles are placed only at the corners of the building

storage rooms and other servants quarters. Garage space for four cars and a gardener's shop are located at the extreme rear of the service wing.

The exterior of the house is Bloomville, O., limestone veneer, colored buff to gray, rock and bed-faced. Basement walls are of tile on concrete footings. Double-hung wood windows, glazed with plate glass, are used throughout. The entrance motif is two stories high, detailed in wood.

Elaborate Interior

Walls of the living room, dining room, library, recreation room, and four bedrooms are of wood panelling; ceilings are canvas covered with decorative wood cornices. Floors of all rooms except servants quarters are glazed mosaic tile. Linoleum is used in the service portion. The stair hall floor and stairs are of marble, with walls of imported Roman travertine.

Heating is provided with a General Electric oil furnace, two boilers, split system, with conditioned air to all main rooms and bedrooms. Ducts have been installed and provision made for a future cooling system. Zone control of servants' quarters and garage is provided by motor-operated steam valves. Copper tubing has been used for hot and cold water piping. A phone system has been installed with outlets at convenient locations.

It was the desire of the owner to erect a fireproof home, with a minimum of upkeep, elimination of shrinkage and settlement cracks, well insulated, and yet not interfering with the established architectural style. A 5-inch stone veneer, set in waterproof mortar and back plastered with waterproof cement mortar, is set with 1-inch air space outside the 3-inch standard channel studs. On the interior of the studs metal lath and plaster are used, the space from lath and plaster to veneer being filled with waterproof, mineral wool insulation. The coefficient of heat transmission for this wall is approximately 0.062.

Floors are constructed of 8-inch steel channels or beams, spaced 3 feet to 3 feet 6 inches on centers, covered with a rib lath upon which 2½ inches of concrete is poured. Tile is bedded and set upon this; areas to be covered with linoleum are finished with a steel troweled surface. Wood floors can be used either in mastic or nailed to sleepers set in the concrete. Metal lath and plaster on the bottom of the floor members furnish the ceiling for rooms below. A complete floor was poured at first, second and third story levels; the sloping roof was framed in wood.

The structural design included ¼-inch scale framing plans of all floors and ¾-inch scale shop details of all wall steel. The walls are composed of large shop-welded steel panels, one story in height, using standard 3-inch channels as studs, and angles, plates, as necessary. All wall panels were detailed to be less than 10 x 18 feet in size, so that they could be safely hauled from the assembly shop to the site. The largest panels weighed only 500 pounds, so that four men were able to handle the erection with only a small A-frame.

Bearing plates were set to level on top of the basement wall. First floor panels were placed and temporarily bolted together. First floor beams and channels were placed, then all first story steel was aligned and welded. Second floor beams were placed, wall panels next and the second story welded. Third floor beams were placed and welded. The total erection required ten working days for four structural iron workers and a foreman. Field welding is of necessity an intermittent process and required one welder most of the ten days.

All welding whether in shop or field was done with the electric arc process, using a portable General Electric welding machine driven with a gasoline motor for the field work. General Electric coated electrodes were used. One quarter inch fillet welds were used almost entirely, lengths of weld and location being shown on the structural drawings. Field welding is kept at a minimum as the cost is considerably more than for shop welding.

Ducts, Pipes in Walls

By the use of girt angles on the inside of the wall frames as support for floor steel no interference is encountered in placing pipes, ducts, and conduits. All exterior studs are securely fastened to the stone veneer at regular spacing to provide mutual stiffening. Interior studs have horizontal tie-straps.

Of the 45 tons of steel used, 63 per cent is in the floors, 34 per cent in the walls and 3 per cent in loose lintels. The cost of the completed steel frame was approximately 6 per cent of the total cost of the house or only 2 per cent more than comparable wood frame and floor joists.

An attempt has been made to design a logical steel frame, economical and efficient, free from special patented features, yet not interfering with the architectural features. Myron T. Hill, Toledo, was the architect, and C. Merrill Barber, Cleveland, was the structural engineer. Steel work was fabricated by Art Iron & Wire Works Inc., Toledo.

Nature Grew It, Steel Improved It

The beautiful wall paneling you see is wood, but it is a veneer, 1/85-inch thick, cemented to a backing of No. 22 gage galvannealed, stretcher-leveled sheets. This makes it fireproof, yet gives the surface of such fine woods as walnut, mahogany, tuya burl or avodire. This paneling, called Ornametl and manufactured by the Haskelite Mfg. Corp., Chicago, is applied by spreading a mastic on the back of each panel, then nailing at the edges if stiles and rails are used, or by means of concealed clips where a butt joint surface is required. Panels range in size from 8 to 10 feet long, 36 and 48 inches wide

Urges Mechanical Engineers To Erect New Social Frontier

CONDEMNING certain present economic policies of government as fallacious, Ralph E. Flanders, retiring president of the American Society of Mechanical Engineers, delivering the 1935 presidential address before the fifty-sixth annual meeting of the society in New York, Dec. 2-6, appealed for the erection of a new social frontier to replace the lost physical frontier, which in the past has meant so much in the development of this country.

The address of Mr. Flanders, who is president, Jones & Lamson Machine Co., Springfield, Vt., constituted the society's eighth Henry Robinson Towne lecture on engineering and economics. The new social frontier, declared Mr. Flanders, should be one of the raised standard of living and, if this frontier is developed, the engineer will come into his own. The raised standard of living demands more goods and services, or better quality and at lower cost. This, he said, is a service which the engineer is qualified to render.

Founding a New Order

In the society dedicated to this end, the engineer will find profitable employment, satisfying recognition and useful, essential service of general good. "With scientists, the inventor and broad-visioned business executives, he will pioneer in the founding of a new order as far as surpassing our present one as that does the barbarism of earlier ages," Mr. Flanders stated. The speaker believed that the country is returning to a period of sanity and intelligence.

W. L. Batt, president, SKF Industries Inc., Philadelphia, was installed as the new president of the society at the annual dinner on Wednesday evening, Dec. 4.

New vice presidents include: A. D. Bailey, superintendent, generating stations, Commonwealth Edison Co., Chicago; Prof. J. A. Hunter, University of Colorado, Boulder, Colo.; R. L. Sackett, dean of engineering, Pennsylvania State college, State College, Pa.; and W. A. Shoudy, Orrok, Myers & Shoudy, consulting engineers, New York.

Three new managers are : W. L. Dudley, vice president, Western Blower Co., Seattle; W. C. Lindemann, secretary, A. J. Lindemann & Hoverson Co., Milwaukee; and J. W. Parker, chief engineer, Detroit Edison Co., Detroit.

The John Fritz medal, highest honor in the engineering profession in the United States was awarded during the meeting to Dr. William F. Durand, professor of mechanical engineering, Leland Stanford Jr. university, Palo Alto, Calif., and a past president of the society, for notable achievement "as authority in hydrodynamic science and its practical application," and for being an "outstanding leader in research and in engineering education."

The American Society of Mechanical Engineers medal went to Charles T. Main, Boston, past president of the society, "for distinguish achievements in the textile and other industries and in engineering education and for eminent services to the engineering profession."

W. L. Batt

The Worcester Reed Warner medal was given to Stephen Timoshenko, professor of mechanical engineering, University of Michigan, Ann Arbor, Mich., "for contributions to the theory of design of elastic structures and the treatment of dynamics and moving machinery."

The Melville medal was awarded to Oscar R. Wikander, Pittsburgh, Pa., for his paper on the subject of draft gear action in long trains. The Junior award went to Stanley J. Mikina, East Pittsburgh, Pa., the Charles T. Main award to G. Lowell Williams, 1935 graduate of Lafayette college, Easton, Pa., and the Student award to Charles P. Bacha, 1935 graduate of Rutgers university, New Brunswick, N. J.

The annual Thurston lecture was delivered by Charles H. Purcell, chief engineer of the San Francisco-Oakland Bay Bridge administration, San Francisco, on the subject of construction methods and equipment employed on the San Francisco-Oakland bridge.

The effect of technological changes on human relations came in for special discussion during the meeting. M. S. Viteles, University of Pennsylvania, Philadelphia, declared that the results of systematic, scientific study of specialized repetitive work show that much of the blame leveled against it has been wrongly directed. Such work can be made and is attractive to at least some workers. There are many, he said, who find routine work desirable, who like automatized tasks that leave the mind free for other pleasurable activities. A smaller number rebel against uniform work, but even in the case of these, adaption is not so difficult as suggested in some quarters.

Perhaps the most encouraging aspect of the study, he declared, is its failure to confirm the point of view that the mind is dulled, emotional maladjustment intensified and broader social participation hindered by repetitive work. The speaker said that the shorter working day, the higher standards of living, the facilities for employe recreation and education made available by progressive industrial firms and public agencies, combined to give the worker an opportunity for self expression outside of working hours beyond the scope of anything that existed in the earlier ages.

Prepare Employes for Changes

C. S. Ching, director of industrial and public relations, United States Rubber Co., New York, stressed the importance of preparing an industrial organization for such technological changes as may be necessary. It is too much to expect, he said, that a group of employes who are confronted abruptly with a new type of machine that employs fewer people than formerly will be widely enthusiastic about the transition. It is absolutely necessary, in preparing for technological change, for the management to think far in advance and to know approximately what the changes are going to be, and then prepare the organization. If the organization is prepared well in advance and is fully cognizant of the management's intention of working out the change slowly and with the least possible hardship, such changes are usually made without great difficulty, he indicated.

Opportunities for the use of skill have decreased alarmingly during late years, according to Dr. Lillian M. Gilbreth, consulting management

engineer, New York. Education in the schools and training in the plants have been neglected, she said. Incentives have been decreased in extent and effectiveness, and the restrictions in production, design and even invention have meant a throttling of skill, the evil effects of which cannot as yet be calculated. There must be freedom to conserve and develop skill if the country is to progress industrially, Dr. Gilbreth further stated.

Scientific advancement along a broad front was reflected in papers presented at various technical sessions during the week. Nowhere was this more indicated than at the sessions devoted to steel and other metals. The creep of metals session revealed the intensive research in recent years in response to indus-

(Please turn to Page 42)

Air-Conditioning Equipment; Business Bureau Defines It

WHAT is air conditioning? What is air-conditioning equipment? Air in homes, hospitals and other public buildings, in commercial and industrial structures, is being "conditioned," and in the conditioning many tons of steel is being used; in fact, the air-conditioning equipment industry is rapidly becoming one of the leading steel consumers. Because of this remarkable growth, the industry does not yet possess a complete nomenclature. Therefore, it is of interest to steel producers, and consumers manufacturing such equipment, to know how the National Better Business Bureau Inc., New York, has construed the term. It has issued the following report as "a guide to the proper use of the term air-conditioning in advertising."

LITERALLY, anything which affects the atmosphere within a structure, such as an electric fan, the opening or closing of a window, a heated radiator, a pail of water, smoking, flowers, and innumerable other factors "conditions" the air to a certain extent.

If there were no industry offering something which it sold to the public as "air conditioning," there might be no objection to describing any of these acts or articles as "air conditioners." But since something called "air conditioning" is being advertised and sold to the public, it is in the interest of both fair competition and the public that there be a mutual understanding of what this term means.

For this reason the National Better Business Bureau Inc., New York, has made a careful inquiry into the subject with a view toward defining air conditioning for the guidance of all who are interested in maintaining public confidence in advertising.

It finds agreement among the manufacturing industry, architects and heating and ventilating engineers that "air conditioning," generally speaking, is the scientific preparation and simultaneous control of the atmosphere within a structure. The atmosphere is affected by such factors as temperature, humidity, motion, distribution, dust, bacteria, toxic gases and ionization.

The three factors which probably affect human comfort to the greatest degree are temperature, humidity and motion of the air. It is the simultaneous control of these three factors which scientific authorities agree constitutes the minimum requirements for air conditioning.

Seasonal Functions Change

Because the functions performed for air conditioning in the summer differ from those required in winter and because units are offered to the public which produce air conditioning in the summer, but not in the winter and vice versa, the following classifications and minimum requirements of air conditioners have been adopted by the trade, scientific authorities and the National Better Business bureau:

Summer air conditioning should perform, as a minimum, the following functions: Cool the air; dehumidify the air; circulate the air.

Winter air conditioning should perform, as a minimum, the following functions: Heat the air; humidify the air; circulate the air.

Year-round air conditioning should perform, as a minimum, the following functions: Cool and dehumidify the air in summer; heat and humidify the air in winter; circulate the air.

It is understood that the functions required by the season of the year are performed automatically and simultaneously to meet the specific minimum requirements demanded by the user.

The bureau requests the co-operation of all interested in fair advertising in eliminating the use of the term "air conditioning" or "air conditioner" or "air conditioned" to describe such articles as fans, humidifiers, odor absorbers, underwear, hats, etc.

Loose terminology of this nature may not necessarily deceive the public but it paves the way for a manufacturer who may wish to "cut corners" to offer to the public air conditioning equipment which does not perform the minimum functions of air conditioning as generally understood by the trade; justifying his deception by claiming that the term "air conditioning" has no exact scientific meaning.

Recently the federal trade commission considered a case where the manufacture of a radiator evaporator claimed to be selling an "air conditioner." After due investigation into the proper use of this term, the commission issued the following release:

"Unfair advertising through use of the words 'air conditioner' to describe a device which is not an air conditioner, as those words are generally understood in the trade, will be discounted by George Landon and Michael Mason Warner, of Chicago, trading as Landon & Warner, under a stipulation entered into with the federal trade commission.

"Landon & Warner agree that in selling a humidifier they will not use in their advertising matter the words 'air conditioner.' The stipulation points out that the respondents' apparatus performs only one of the functions of an air conditioner, namely, that of supplying humidity."

Call for Co-operation

The bureau recommends that publishers, advertising agencies and advertisers apply the definitions given herein in the censorship and preparation of advertising copy.

Attention also is called to the fact standards for rating and testing air conditioning equipment have been formulated by a joint committee composed of engineering representatives of the American Society of Refrigerating Engineers, the American Society of Heating and Ventilating Engineers, the Air Conditioning Manufacturers' association, the Refrigerating Machinery association, and the refrigeration division of the National Electrical Manufacturers association.

These standards embody the best thought of leading air conditioning technicians and enable a purchaser of air conditioning equipment to buy with a greater degree of certainty of securing an air conditioning installation which will furnish the air conditions he desires.

Alloys from Boulder Current?

Only eight products are worthy of serious consideration for the use of Boulder dam electric power in their manufacture, the science advisory board reported to President Roosevelt last week. These include ferromanganese, ferrotungsten, magnesium, aluminum, calcium carbide, boron carbide, silicon carbide, and electrolytic zinc.

Production

STEELMAKING reached a new high for the year last week when it rose another point to 57 per cent. Heavier schedules at Youngstown, Chicago, eastern Pennsylvania, Buffalo and New England are responsible. In Pittsburgh there was a 2-point decline, while other districts held steady or increased. Tentative schedules at Youngstown indicate this rate may be slightly bettered this week. Further details follow:

Youngstown—Gained 2 points last week to 60 per cent, and at this week's opening the rate is expected to reach 62. Yougstown Sheet & Tube Co. has blown in a blast furnace and started its bessemer furnace at the Campbell plant.

Chicago—Increased ½ point to 63 per cent. A sharp decrease had been anticipated, but a leading interest which had scheduled mill alterations which would necessitate the closing down of a bank of furnaces postponed this work until the Christmas period. The current rate, third highest for any week this year, is expected to continue for a short period. Blast furnace schedules are unchanged, 19 of 41 stacks being active.

Wheeling—Steady at 78 per cent last week. Of 37 open-hearth furnaces, 29 continue in operation; one producer having 16 on, a second 11, and a third mill operating 2.

Pittsburgh—Off 2 points to 43 per cent last week. Corporation subsidiaries are averaging an ingot rate of 35 per cent, with the independents producing at 50-55 per cent. Operations are expected to hold at better than 40 per cent for the next two weeks, due to the predetermination of producers to accumulate stocks and distribute heavy Christmas payrolls.

Twenty-eight out of 60 steelworks blast furnaces continue active. Carnegie-Illinois Steel Corp. has 12 of 32 on; Jones & Laughlin Steel Corp., 8 of 11; National Tube Co., 1 of 4; Pittsburgh Crucible Steel Co., Pittsburgh Steel Co., and American Steel & Wire Co., each 1 of 2. Bethlehem Steel Co., at Johnstown, Pa., has 3 of 7 in blast.

Cleveland-Lorain—Unchanged at 82 per cent. Republic Steel Corp.'s Corrigan-McKinney division lighted one more open hearth to operate all 14 units, the first time this has been done since the World war. Otis Steel Co. dropped one, to operate seven of its eight units, while National Tube Co., Lorain, continued with 11 of its 12. Corrigan-McKinney also lighted its fourth blast furnace, operating this department 100 per cent. Otis Steel continued with both its stacks in blast, and National Tube with three of its five stacks active. The latter company's bessemer converter also was on double turn last week.

Buffalo—Increased 7 points to 47 per cent last week. This rate will continue through this week. It is expected the rate will turn sharply higher early in the new year, when Bethlehem's new strip mill gets into full production.

Birmingham—Unchanged at 56 per cent last week, and it is expected this rate will be maintained through the year.

Central eastern seaboard—Rose ½ point last week to 39½ per cent. It is believed that the rate has now reached a peak for the year, with the upward trend likely to be resumed early next year. Two eastern plate mills each took off one furnace last week, but this was offset by another mill adding one to its active list.

Detroit—Steady at 94 per cent last week, with one producer operating eight out of nine, and another melting in all eight.

New England—Up 3 points to 93 per cent last week, with schedules for this week indicating a loss of a few points. Two works were at 100 per cent last week.

Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Dec. 7	Change	Same week 1934	Same week 1933
Pittsburgh	43	— 2	23	24
Chicago	63	+ ½	34	25½
Eastern Pa.	39½	+ ½	20½	18½
Youngstown	60	+ 2	35	35
Wheeling	78	none	70	41
Cleveland	82	none	48	54
Buffalo	47	+ 7	24	24
Birmingham	56	none	27½	52
New England	93	+ 3	47	81
Detroit	94	none	48	36
Average	57	+ 1	30	29

Ingots Make Best November Since '29

STEEL ingot production in November reached the highest average daily production for any November since 1929 and the highest for any month since May, 1934, according to the compliation of the American Iron and Steel institute.

The average daily rate in November was 121,279 gross tons, compared with 116,535 gross tons for October and with 61,947 gross tons for November, 1934. The percentage of capacity engaged in November was 54.78, compared with 52.64 in October and with 28.13 in November, 1934.

Total calculated production in November was 3,153,247 gross tons, compared with 3,146,446 tons in October and with 1,610,625 tons in November, 1934.

Total production in 11 months this year has been 30,313,507 gross tons.

Steel Ingot Production

	Monthly Production—Complete for Bessemer; Open Hearth, Calculated from Reports of Companies Making 97.91 per cent						Calculated daily production, all companies (gross tons)	Number of working days
	Open Hearth		Bessemer		Total			
	Gross tons	Per cent of capacity	Gross tons	Per cent of capacity	Gross tons	Per cent of capacity		
1935								
Jan.	2,631,673	49.73	239,858	34.99	2,871,531	48.04	106,353	27
Feb.	2,553,429	54.28	224,336	36.82	2,777,765	52.28	115,740	24
Mar.	2,637,331	51.75	230,810	34.97	2,868,141	49.83	110,313	26
Apr.	2,408,588	47.27	231,916	35.14	2,640,504	45.87	101,558	26
May	2,381,061	44.99	254,796	37.17	2,635,857	44.10	97,624	27
June	2,020,406	41.23	210,487	33.17	2,230,893	40.31	89,236	25
July	2,045,768	40.15	224,456	34.01	2,270,224	39.44	87,316	26
Aug.	2,685,965	50.76	233,361	34.05	2,919,326	48.84	108,123	27
Sept.	2,596,098	52.98	233,737	36.83	2,829,835	51.13	113,193	25
Oct.	2,875,727	54.34	270,719	39.50	3,146,446	52.64	116,535	27
Nov.	2,901,084	56.93	252,163	38.20	3,153,247	54.78	121,279	26
11 mo.	27,707,768	49.68	2,606,639	35.89	30,313,507	48.15	105,991	286
1934								
Jan.	1,824,640	34.69	172,489	25.17	1,997,129	33.59	73,968	27
Feb.	2,036,071	43.55	175,873	28.87	2,211,944	41.86	92,164	24
Mar.	2,594,536	49.33	203,904	29.75	2,798,440	47.07	103,646	27
Apr.	2,678,582	55.00	257,482	40.57	2,936,064	53.34	117,443	25
May	3,067,874	58.33	331,620	48.38	3,399,494	57.18	125,907	27
June	2,776,891	54.83	282,592	42.81	3,059,483	53.44	117,672	26
July	1,369,584	28.12	119,869	18.89	1,489,453	27.06	59,578	25
Aug.	1,271,752	24.18	109,598	15.99	1,381,350	23.24	51,161	27
Sept.	1,151,362	23.64	117,615	18.53	1,268,977	23.05	50,759	25
Oct.	1,354,113	25.75	127,789	18.64	1,481,902	24.93	54,885	27
Nov.	1,478,566	29.19	132,059	20.01	1,610,625	28.13	61,947	26
11 mo.	21,603,971	38.78	2,030,890	27.96	23,634,861	37.53	82,639	286
Dec.	1,832,790	37.63	131,467	20.72	1,964,257	35.68	78,570	25
Total	23,436,761	38.68	2,162,357	27.39	25,599,118	37.38	82,312	311

Capacity percentages for 1935 are based upon open-hearth capacity of 60,954,717 tons and bessemer of 7,895,000 tons on Dec. 31, 1934; for 1934 based on open-hearth capacity of 60,583,813 tons and bessemer of 7,895,000 tons on Dec. 31, 1933

November Iron Output High For 5 Years; 6 Furnaces In

NETTING substantial gains in both total output and average daily rate, production of coke pig iron in the United States in November rose to the highest level in five years, or since October, 1930. At the same time, an increase of six active blast furnaces carried the total operating units to 122, the largest number recorded since September, 1930, with 126.

Average daily production in November was 68,876 gross tons, an increase of 7.9 per cent, or 5058 tons, over the 63,818-ton daily rate of October. The rate in November, one year ago, was 31,930 tons.

In spite of the fact that November was a one-day shorter month than October, total output in November with 2,066,293 tons, registered a gain of 87,914 tons, or 4.4 per cent, over the 1,978,379 tons made in October. Production in November, 1934, was only 957,906 tons.

MONTHLY IRON PRODUCTION

Gross Tons

	1935	1934	1933
Jan.	1,478,443	1,225,643	568,785
Feb.	1,614,905	1,270,792	553,067
Mar.	1,770,990	1,625,588	542,013
Apr.	1,671,556	1,736,217	623,606
May	1,735,577	2,057,471	892,326
June	1,558,463	1,936,897	1,264,953
July	1,520,340	1,228,544	1,801,345
Aug.	1,759,782	1,060,187	1,833,265
Sept.	1,770,259	899,075	1,507,931
Oct.	1,978,379	951,353	1,358,540
Nov.	2,066,293	957,906	1,083,740
11 mo.	18,924,987	14,949,673	12,029,571
Dec.		1,028,006	1,192,136
Total		15,977,679	13,221,707

For the 11 months of the current year, production has aggregated 18,924,987 gross tons, which represents an increase of 26.6 per cent, or 3,975,314 tons, over the output of 14,949,673 tons in the corresponding period of 1934.

Relating production to capacity, the operating rate for November was 49.5 per cent, against 45.8 per cent in October, 22.8 per cent in November, 1934, and 26.2 per cent in November, 1933. The November rate was practically equal to the 49.6 per cent rate of October, 1930.

The total of 122 active stacks on Nov. 30 compares with 116 on Oct. 31, and 60 on Nov. 30, one year ago. During the month, 3 steelworks furnaces and 4 merchant furnaces resumed. The only stack blown out was a steelworks unit.

Blast furnaces resuming in November were: In Pennsylvania: Clairton No. 1, Carnegie steel Co. In New York; Standish, Chateaugay Ore & Iron Co. In Maryland, Maryland E, Bethlehem Steel Co. In Alabama: Birmingham No. 2 Republic Steel Corp.; Ensley No. 2, Tennessee Coal, Iron & Railroad Co.; Woodward No. 2, Woodward Iron Co. In Minnesota: Zenith, Interlake Iron Corp.

AVERAGE DAILY PRODUCTION

Gross Tons

	1935	1934	1933	1932
Jan.	47,692	39,537	18,348	31,336
Feb.	57,675	45,385	19,752	33,122
Mar.	57,120	52,438	17,484	31,194
Apr.	55,719	57,873	20,786	28,524
May	55,986	66,370	28,784	25,282
June	51,949	64,563	42,165	20,867
July	49,043	39,630	58,108	18,394
Aug.	56,767	34,199	59,137	17,035
Sept.	59,009	29,969	50,264	19,788
Oct.	63,818	30,689	43,824	20,795
Nov.	68,876	31,930	36,124	20,858
Dec.		33,161	38,456	17,650
Ave.	56,662	43,774	36,223	23,699

The only furnace removed from operation during the month was: Youngstown No. 3, Republic Steel Corp.

With the dismantling of the Star blast furnace of the Star Furnace Co., Jackson, O., as announced in STEEL, Dec. 2, page 19, the number of potential units in the country is reduced from 269 to 268. This unit had an annual capacity of 30,000 tons of silvery irons, etc. It was built in 1866, last rebuilt in 1913 and last operated in 1923.

NOVEMBER IRON PRODUCTION

	No. in blast Last day of Nov.	Oct.	Total tonnage Merchant	Non-merchant
Ohio	29	30	101,697	422,113
Penna.	37	36	78,949*	493,601*
Alabama	11	8	81,278	46,341
Illinois	10	10	49,320	152,412
New York	10	9	50,313	111,685*
Colorado	1	1		
Indiana	9	9		
Maryland	4	3	10,172*	303,269
Virginia	1	1		
Kentucky	1	1		
Mass.	0	0		
Tenn.	0	0		
Utah	1	1	12,855	152,288
West Va.	3	3		
Michigan	4	4		
Minnesota	1	0		
Missouri	0	0		
Total	122	116	384,584*	1,681,709*

*Includes ferro and spiegeleisen.

RATE OF OPERATION

(Relation of Production to Capacity)

	1935[1]	1934[2]	1933[3]	1932[4]
Jan.	34.2	28.3	13.3	22.1
Feb.	41.4	32.5	14.3	23.4
Mar.	41.0	37.5	12.7	22.0
Apr.	40.0	41.4	15.1	20.2
May	40.2	47.5	20.9	17.9
June	37.2	46.3	30.6	14.7
July	35.2	28.4	42.4	13.0
Aug.	40.7	24.5	42.8	12.0
Sept.	42.5	21.5	36.4	14.0
Oct.	45.8	22.1	31.8	14.7
Nov.	49.5	22.8	26.2	14.7
Dec.		23.7	27.9	12.5

[1]Based on capacity of 50,845,741 gross tons, Dec. 31, 1934; [2]capacity of 50,975,561 tons, Dec. 31, 1933; [3]capacity of 50,313,975 tons, Dec. 31, 1932; [4]capacity of 51,598,175 tons, Dec. 31, 1931. Capacities by American Iron and Steel Institute.

Make New Division of Triborough Bridge Piling

Several weeks ago, following the disclosure that PWA funds were about to be used for the purchase of German-made steel piling for approaches to the Triborough bridge, New York, the contract for the piling was rescinded and an order for 350 to 500 tons of piling was reported placed with the Jones & Laughlin Steel Corp., Pittsburgh (STEEL, Nov. 25, p. 14).

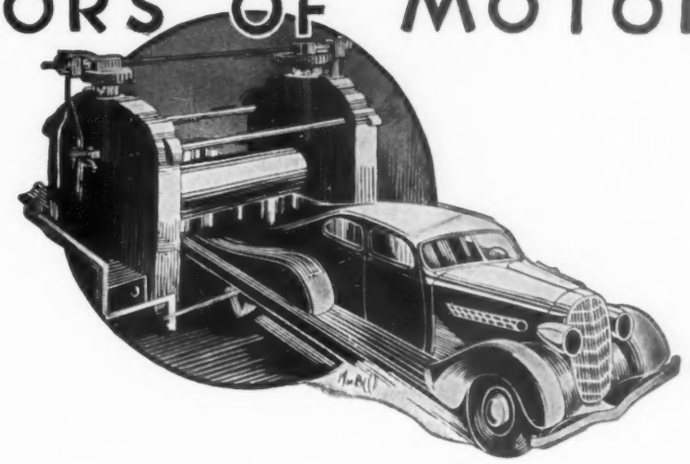
A new division of this requirement has now been made. About 600 tons has been about equally divided between the Carnegie-Illinois Steel Corp. and Jones & Laughlin, the former taking most of the new material and the latter most of the used. The Woodcrest Construction Co., New York, is the general contractor.

Carnegie-Illinois also has booked 450 tons of piling for a bulkhead wall for the Triborough bridge for the East River drive from East 119th street to East 124th street, through the Merritt-Chapman & Scott Co. This job never was connected with the German piling incident.

FTC Charges Monopoly In Buffing Wheels

Alleging a combination and agreement for suppressing competition in the sale of buff and polishing wheels and enhancing prices thereof to the public, the federal trade commission has issued a complaint against the Buff and Polishing Wheel Manufacturers' association, New York, and 33 eastern and middle western companies controlling almost the entire production of buff and polishing wheels in the United States. All but one of the companies are members of the association.

MIRRORS OF MOTORDOM



DETROIT

YOU can name on the fingers of one hand the motor car builders in the high-price field who are still surviving America's stampede to low-priced transportation. Being left out in the cold in this whole-hearted swing has been more severe to those select few than any winter climate.

But, when you're naming them over, set up a credit mark to Packard. From all Detroit hears, it's ready to hand an orchid to the Packard people for fighting fire with fire.

To retrospect, Packard in the lean years of the early thirties found that its former field was slipping like sand through your fingers. A few sales on the high-tagged eights and twelves weren't enough to carry the earnings sheet through in black ink.

Meeting Demands of Times

So, the inevitable was faced, not bucked. Packard's energies switched to development of the 120, a model that took off to a flying start in the $1000-$1200 field and has held the front-line trenches ever since.

Indeed, so much has the 120 gained ground that in some months of 1935 more have been made than in an entire year on the high-priced eights and twelves. Right now about 6500 small jobs are being made in a month.

But, at its inception the 120 was admittedly an experiment; consequently, only the two closed jobs and a convertible were made. That is, up until now. Very shortly Packard will blossom out with four new models on this line: A 7-passenger sedan, a town sedan, a cabriolet, and a new convertible.

These four will round out the Packard lines nicely, lending a firmer foothold. Restyling is to be a keynote in the new models, with a new interior trim design, completely changed and restyled instrument panel, and a few minor mechanical refinements.

Changes already made in the present 120 for 1936, that is, new door hinging, inclusion of the trunk in the rear, and redesign of the front fender curve, will all carry over to the four new models. The motor will be the same.

That much for the four new 120's. In addition, Packard has a weather eye peeled on mid-1936 and 1937, and it would not be surprising if a further plunge into the lower-price class would be taken.

The management by now has assembled a good many material and parts costs, as well as those for new equipment, to make a small six. Summons have been given to makers of machine tools to give estimates, certain plant rearrangements are planned at Packard, and the pencil stage has given way to the blueprint.

Up to a week ago a number of machine tool builders had been asked for prices on heavy machines for motor assemblies to be "delivered in three to four months so that the new car can be on the streets in April." But such demands are more in the shape of feelers to see how quickly a change can be made, if it is decided on.

There's no doubt that Packard is flirting with the small six idea, and, judging from the lack of die inquiry, many of the parts would be interchangeable with the present 120 models. Most of the inquiring is going on in a prospective retooling operation.

Squeezing Into Packed Field

The six, of course, would have a smaller motor, lighter frame, and smaller axle, radiator and transmission. Presumably, it could be dropped into the $700 or $800 price field. In fact, through competition with other six-cylinder models, it necessarily would have to be.

For instance, Chevrolet at $495 names the lowest base price on a six. Plymouth is $510, and both Pontiac and Terraplane, $616, and Olds, $665. To mention a few more in the six field and just to show the type of competition, the lowest base price on a Chrysler six is $760; Hudson, $730; Reo, $795; and Auburn, $745. Doubtless Packard plans to squeeze in somewhere in that last group. The cheapest present Packard 120 is $990, base.

Packard's big decision at the moment is to correlate costs and volume and still get into this market. If the way looks clear, the O. K. will soon be given.

Harking back to the pre-natal days of the 120, Detroit believes this new story but fails to get steamed up over seeing Packard out with a six in a rapid-fire time. The 120 was some 15 months from the time the public first heard of it, or the time When President Macauley confirmed it at a stockholders' meeting, until it was out on the streets.

Not a New Experience

Therefore, no earlier than next spring, more likely next midsummer, should see Packard's further entrenchment in the low-priced market. A six would not be exactly a surprise, for a decade or so ago Packard supplemented its then popular "twin-six" with a small six and a large six. That wasn't so long ago that a six motor would be exactly an innovation for Packard plant men to make.

Packard, incidentally, completed a fairly sizable steel buy a week ago, also purchases for other materials. It is talking 6000 jobs this month, and a rough estimate would have 75,000 120's out in 1936.

Out at Ford they're still clicking off 85,000-unit months, but the Motor Products situation, or account of a possible holding of Ford radiator grilles, is a keg of powder.

Motor Products, since the "bugs" were ironed out of the radiator grilles for the 1936 Fords (and that wasn't so many weeks ago) has been working on a two-week float. In other words, roughly, some 40,000 grilles have been kept ahead and in

transit for just such contingencies as the strike.

Then, about three weeks ago, three unions ran head on in the Motor Products plant, and abetted by a few out-and-out agitators, threw the plant's employes out of work.

Not all were affected and at most times in the last two weeks one 9½-hour shift has been run with about 2000 employes on hand. So far so good at Ford, for the float had not exactly vanished, though it had dwindled.

Last Tuesday night, Dec. 3, the Motor Products management sought to reopen on a three-shift basis, but in running the picket lines, 18 strikers, two policemen and a woman were injured in a tear gas and brickbat fracas.

Though Motor Products has recovered to 5700 Ford grilles daily during the strike, even on a one-shift basis, the situation is still inherently dangerous. So far no dies or welding equipment have been moved out of the Motor Products plant, as it was from City Auto Stamping Co. in Toledo to Dearborn at the time of the "Battle of Toledo" a year ago last summer. The only equipment Motor Products has moved has been one of five sets of equipment working on Ford drain pans, this being shifted to Dearborn, of course temporarily. Motor Products, aside from Ford radiator grilles, makes some Ford moldings and is an important parts source for Chrysler and Hudson, also.

Chevrolet Moving Ahead

Consequently, Chevrolet is making hay while the strike tables are turned. Last year it was Chevrolet's Toledo transmission plant that jammed up things. This year, Ford is getting a taste of apprehension.

Chevrolet assemblies the last week have been clicking at 24,000 jobs, now ahead of Ford. One day recently Chevrolet made over 6000 models. The various Chevrolet parts' plants are working to maintain a parts bank of 75,000 jobs. In other words, various castings, machined, forged and rolled steel parts are being kept in the bins for a total of three weeks' assemblies.

In transmissions alone, Chevrolet last week was carrying close to 190,000 units, products of not only Toledo but also Muncie, Ind., and Saginaw, Mich. For obvious reasons the transmission bank is disproportionately high. Only in sheet metal storage facilities does Chevrolet appear to have a weak link.

Chevrolet's banks are nothing, though, in relative comparison with what Chrysler is carrying, especially for the Plymouth division. However, Plymouth's inventory runs predominately to frames and motor blocks. One reason is the ambitious 500,000 Plymouths being planned for 1936.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1933	1934	1935
Jan.	128,825	155,666	292,817
Feb.	105,447	230,256	335,700
Mar.	115,272	338,434	429,834
Apr.	176,432	352,975	477,746
May	214,411	330,455	364,727
June	249,727	306,477	361,321
July	229,357	264,933	337,044
Aug.	232,855	234,811	240,051
Sept.	191,800	170,007	89,805
Oct.	134,683	131,991	275,021
Nov.	60,683	83,482	*380,000
11 mo.	1,839,492	2,599,487	3,584,066
Dec.	80,565	153,624	.....
Year	1,920,057	2,753,111	.....

*Estimated.

Estimated by *Cram's Reports*

Week ended:

Nov. 30	83,358
Dec. 7	93,180

Incidentally, Briggs is now running the newly-acquired Evansville, Ind., division at capacity on Plymouth bodies.

Some big news is due to pop at General Motors shortly in the truck line. Olds will be out with a 1-ton truck, the first time it has ever been in this type of automobile production.

Chevrolet already produces a ½-ton and a 1½-ton commercial, so the new 1-ton Olds will nicely supplement the entire General Motors' line. The two Chevrolet trucks are in three wheelbases—112, 131, 157 inches—and each has 6-cylinder valve-in-head truck engines. Doubtless Olds will drop its truck in between the first two of these wheelbases.

One outcome of publication of the new trade agreement between the United States and Canada is to slow down shipments of fenders and other automotive parts to Canada. Only parts absolutely necessary to production in December are being exported across the Detroit river, because the duties will be reduced or eliminated Jan. 1.

Among the constant checks being made by automobile manufacturers and their suppliers to improve the performance of cars is one on bearings and lubricating oils. While much research and test work has been carried on and it has been quite definitely established that certain lubricants containing oleic and fatty acids and certain solvent-processed mineral oils are responsible for corrosion of both copper-lead and cadmium-silver bearings under certain conditions, a study of the results obtained by a number of laboratory and field investigations indicates that the cadmium-silver is at least as resistant to corrosion as the best of the copper-lead alloys in use at the present time.

Financial

EXTRA dividends were ordered last week by a number of equipment manufacturers and fabricators of steel, but only one producer participated. This was McKeesport Tin Plate Co., McKeesport, Pa., which will pay 25 cents in addition to the regular quarterly payment of $1, Jan. 2 to record of Dec. 17. Other declarations last week were:

United Engineering & Foundry Co., Pittsburgh, an extra Christmas payment of 50 cents on common, Dec. 24 to record of Dec. 14.

Blaw-Knox Co., Blawnox, Pa., special dividend of 10 cents Jan. 2 to record of Dec. 4. Previous dividend was in March, 1932.

Ross Gear & Tool Co., Lafayette, Ind., 50 cents in addition to quarterly 30 cents, Dec. 31 to record of Dec. 20.

Climax Molybdenum Co., Washington, Pa., extra and quarterly, 20 cents each, Dec. 24 to record of Dec. 10. On June 29, 25 cents was paid, and on Sept. 30, 50 cents.

Interlake Steamship Co., Cleveland, affiliated with Pickands, Mather & Co., extra of 60 cents in addition to regular 25 cents, payable Dec. 31 to record of Dec. 14. Interlake is offering to purchase up to 40,000 shares at $35.

ARMCO ON $1.20 BASIS

American Rolling Mill Co., Middletown, O., last week declared a quarterly dividend of 30 cents a share on the common, payable Jan. 15 to record of Dec. 23. A similar dividend was paid Oct. 15, the first since Jan. 1931. This puts American Rolling Mill on a $1.20 basis.

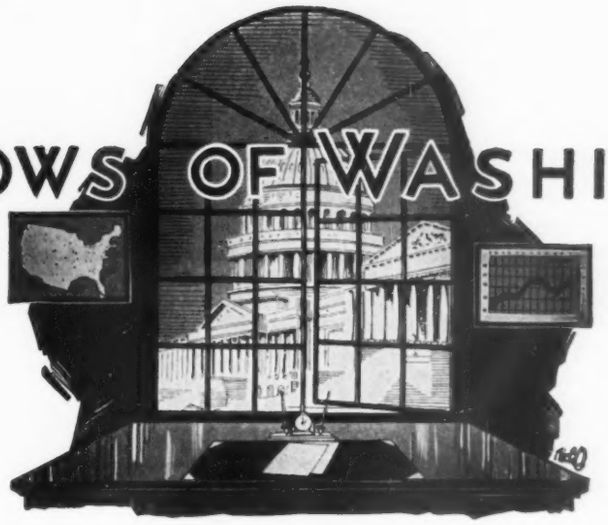
SEEK MACKINTOSH PLANTS

Hearing held in federal court at Pittsburgh, Dec. 2, in the Mackintosh-Hemphill Co.'s petition to enter voluntary bankruptcy, revealed a counter-offer of $550,000 to the present management from an undisclosed source for outright purchase of the Wooster, O., division. At a previous hearing the bondholders' protective committee, seeking to prevent the voluntary bankruptcy, revealed an offer of $900,000 from another buyer for the Wooster, O., Midland, Pa., and Pittsburgh properties of the Mackintosh-Hemphill Co.

WHEELING CALLS BONDS

Wheeling Steel Corp., Wheeling, W. Va., will redeem all its first and refunding mortgage sinking fund 5½ bonds on Jan. 1, 1936, which are due July 1, 1948, at 103.

WINDOWS OF WASHINGTON



WASHINGTON

THE stage is all set for the Berry industrial-labor conference beginning Dec. 9 and it now remains only to see how the players act and what kind of a show they put on.

There are varying opinions here, and you can hear almost anything depending on whether you are listening to the Berry lieutenants or to the industrialists who are opposed to the conference—of which there are legion.

There were different ideas the latter part of last week as to what would or should be done by industry at the conference, but of one thing there is certainty—various industrial groups were meeting in Washington on Saturday and Sunday to discuss their own point of view and to decide on action.

In the meantime, Major Berry and his assistants have gone ahead and, anyhow, they have made sure that the press will be taken care of. That was a forgone conclusion because if there is anything that Major Berry is craving from this conference it is favorable mention.

One of the interesting sidelights of the conference is the fact that it will be held in the so-called federal auditorium, which is between the new department of labor and interstate commerce commission buildings, and this will be the first large conference to be held there.

Keep Out of Commerce Building

It is well known that Secretary of Commerce Roper has been opposed to the conference, and so when the question is asked of Major Berry's cohorts why the conference was not held in the very suitable auditorium of the department of commerce they simply reply that Monday is the day on which repairs are to be commenced there. Strange?

Certain tentative groupings have been arranged for the executive meetings, and the iron and steel industry is grouped under "fabricating and processing." There are 15 other commodities under that same heading, including machinery, equipment, nonferrous products, chemicals, and the like.

The other group headings include producing, transport, public services, distributing trades, service trades, foreign trade and construction. It has been announced that these groupings may be changed later or broken down if it seems best.

Scatter Into Group Meetings

Henchmen of Major Berry contend that 1500 acceptances have been received for the conference. Cards of admission will be necessary to attend even the opening meeting. Major Berry believes that between 2000 and 3000 persons will attend.

The group meetings, to follow the first open meeting, will be held in various hotels and government buildings. A liaison officer will be named from the Berry staff to keep in touch with the progress of each group, and supply information, if necessary.

No particular time has been specified to group sessions in which to complete their discussions and prepare a report for the industrial council. On the other hand, there has been considerable change in the attitude of Major Berry on this point.

At one time he announced publicly at a press conference that he thought the council might sit for several weeks. Now, however, "it is believed, that group discussions, which begin on the afternoon of Dec. 9, will be practically completed the following day."

Major Berry explains that the proposed industrial groupings were charted as a means of facilitating the discussion of specific as well as general problems of industry. "The groupings we have suggested," he said, "are in no sense arbitrary. Industry and labor representatives are perfectly free to appeal from our proposed organization of the conference, and sit with the group which they believe is most directly concerned with their particular interests. Or they may form a separate group if they so desire, and after discussion and formulation of a program, name one of their number to carry their suggestions to the council of industrial progress."

There is a very general feeling here that Major Berry is trying to get things set so that the conference will result in a permanent organization of business and labor giving continuous attention to industrial problems of one kind or another. This is sure to meet with the opposition of Secretary Roper. On the other hand, Major Berry has had this in mind for a long time and he will do everything he can to put it over if it is at all possible.

NRA To Remain a Corpse

In some quarters here—generally well informed—it is believed that this will be the final outcome of the conference because Major Berry is becoming more and more convinced that this is no time to try and push the idea of a permanent NRA. In fact, Major Berry said last week:

"I can see no reason why some industry leaders prefer to indulge in a bad case of NRA jitters rather than to face squarely toward the realities of the present and future.

"NRA is dead, indeed. No one faces that fact with more conviction than I who have devoted my time without government compensation for two years to the battle to keep it alive and make it function.

"Regardless of past trials and errors, the struggle for fair play in business goes on. It will go on, regardless of any vicious thrusts at a prostrate law, and loud lament about 'government bureaucracy,' or any refusals to take part in a dignified and sincerely arranged conference of industry management and labor under government auspices."

On the other hand, eyebrows were lifted the past week at the dispatch from Warm Springs quoting the

President as saying that of the four major bills he wants passed at the coming session of congress, a permanent NRA is one of them.

In this connection it is reliably reported here that a new NRA bill will be drawn up if business can be persuaded that it wants any more of it. The matter has been pursued so far, that report says, that the President has approved at least certain portions of it. No definite conclusion will be reached on the bill, however, until after the Berry conference.

EXPECT TAYLOR TO STAY ON SMALLER ROPER COUNCIL

Secretary of Commerce Roper's business advisory council, which has been at loggerheads with Major Berry and his conference, met and adjourned here last week, having said nothing at all about the Berry meeting but resolving "that the personnel and functions of the skeleton NRA be transferred to the department of commerce where kindred activities and surveys connected with business and industry are conducted by trained career men, conversant with the background of these problems of business and industry which were temporarily dealt with by the NRA during the emergency."

At the same time, the council adopted a plan of reorganization worked out by a committee headed by H. P. Kendall, prominent textile manufacturer, which would allow the council to rotate in office, half of the 52 members changing every year. This, of course, is in an effort to keep down the resignations which have been quite general during the past year and which were again expected to break out if this change had not been made in personnel.

While officials of the department of commerce will make no formal announcement, it is understood on good authority that Myron C. Taylor, chairman of the United States Steel Corp., who has represented the steel industry on the committee since its organization, has offered to continue to serve on the committee at the pleasure of Mr. Roper. It is reported that he will be asked to remain a member of the council for the coming year.

ORDER REQUIRING GUFFEY COAL FOR GOVT. STEEL NEARS

In view of the fact that the government has commenced to crack down on its various departments and bureaus to buy their bituminous coal only from those mines which have signed up with the national bituminous coal commission, Washington representatives of steel companies bidding on government contracts are wondering if this is just the forerunner of similar conditions regarding the purchasing of steel only from companies buying their coal from mines also having signed up with the commission.

Letters from the coal commission to the procurement division of the treasury department along this line already have been cited in these columns, but up to this time no clause has been inserted in government contracts enforcing these conditions.

"The federal government, and those holding federal contracts," said Commissioner Walter H. Maloney, speaking for the commission last week, "are extremely heavy users of bituminous coal. And there is no escape from the mandatory provision of the act requiring that compliance with the code be checked before any contracts are approved."

Reports to the coal commission indicate that federal agencies are moving swiftly in putting into effect the requirements under the coal act that all supplies of coal purchased by the government and its contractors be secured from purchasers assenting to and complying with the code, the commission states officially.

Activities of Steel Users and Makers

BLISS & LAUGHLIN INC., Harvey Ill., received first prize for the most distinctive booth design and product display at the 1935 exposition of the purchasing agents convention in Chicago Nov. 20-21. Bliss & Laughlin in its prize winning booth depicted the progressive development of bars from hot-rolled stock to cold-drawn and ground shafts and to turned and polished shafts. An interesting exhibit of machine parts was shown to illustrate the application of Bliss & Laughlin ultra-cut steel and bessemer screw stock in the manufacture of hundreds of different formed and threaded parts, used in assemblies of machinery and equipment.

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Granite City Steel Co., Granite City, Ill., has removed its Chicago district sales office to the Willoughby tower, 8 South Michigan boulevard, effective Dec. 1.

• • •

Buffalo Wholesale Hardware Co., Buffalo, has been consolidated with the wholesale hardware house of Burhans & Black, Syracuse, N. Y. Operations at Buffalo are being discontinued.

• • •

Sterling Wheelbarrow Co., West Allis, Wis., in the past 30 days has made rush delivery of 4000 barrows of the all-steel type to the government for public works projects in Illinois and Minnesota. The company continues to show a substantial increase in foundry flask business.

• • •

An expansion of Thompson Products Inc., Cleveland, automotive valve manufacturer, was announced last week in the affiliation of the business of the Toledo Steel Products Co. Toledo, O., with that of Thompson Products. In making the announcement, F. B. Crawford, president of Thompson, stated that ownership of the Toledo company was vested in a holding company and recent legislation has made it desirable that this holding company liquidate that ownership. Both companies will continue as separate entities.

Meetings

TWO chapters of the Institute of Scrap Iron and Steel Inc. elect officers this week. Wednesday evening the Pittsburgh chapter, with I. W. Solomon presiding, meets at the William Penn hotel. Thursday evening the Boston chapter, with Harry Cohen presiding, meets at the Parker house.

Institute Cites Uneven Competition in Exports

Almost 93 per cent of iron and steel, exclusive of scrap, shipped from this country in the first ten months of 1935 went to countries either producing no steel or depending upon outside sources for important part requirements, states the American Iron and Steel institute. Only about 5.1 per cent exported went to the great steel producing nations of Europe which, on the other hand shipped more than 80 per cent of the steel imported here in the first ten months. Steel importations for this period are 37 per cent ahead of the corresponding period of last year. Canada, it was pointed out, has taken more steel this year from the United States than any other country, taking 24.8 per cent of the total exclusive of scrap.

Another Sign of the Times

Last week STEEL, page 19, carried the announcement of the University of Pittsburgh that all members of its 1935 class in metallurgy had been absorbed by the steel industry. Purdue university, Lafayette, Ind., reports similar success. According to J. L. Bray, head of Purdue's school of chemical engineering, all 14 men who were graduated last year in metallurgical engineering have been placed, also 85 per cent of the entire class of 78 in chemical engineering.

Industrial Men in the News

C. D'W. Gibson, Vice President, International Acetylene association

A background of 16 years buttresses his experience in the acetylene field.

After serving in France during the World war, he became affiliated with the Air Reduction Co.

He has been active in the Boston, Richmond, Va., Detroit, and New York sales offices of his company.

C D W. GIBSON recently elected vice president of the International Acetylene association at the annual meeting of the body in Cleveland in November, has been identified with the acetylene industry since May, 1919. He is assistant vice president and general sales manager, Air Reduction Co. Inc., with offices at that company's headquarters, 60 East Forty-second street, New York.

Mr. Gibson is a native of Schenectady, N. Y. He attended Union college, that city, as a member of the class of 1920, and studied electrical engineering. The war interrupted his college career and in May, 1918, he went to France with the Seventy-seventh division and served as captain in the 306th infantry until his return to the United States in May, 1919.

He then became connected with the Air Reduction Co., as a salesman in the Boston district. He was later transferred to Richmond, Va., as district manager, and subsequently to Detroit as manager of that district. In December, 1926, he was appointed assistant to the first vice president and transferred to New York, and in 1928 was promoted to assistant vice president and general sales manager.

Other societies of which Mr. Gibson is an active member are the American Iron and Steel institute and the American Welding society. He resides in New York city.

♦ ♦ ♦

E. B. Cleborne, president, Wallingford Steel Co., Wallingford, Conn., will remain president of the company, control of which is being acquired by the Ludlum Steel Co., Watervliet, N. Y.

H. G. Batcheller, president of Ludlum, is expected to become chairman of the board of Wallingford.

Mr. Batcheller, A. F. Dohn, vice president of Ludlum in charge of sales, F. B. Lounsberry, vice president of Ludlum in charge of operations, and N. F. Towner, secretary of Ludlum, will become directors of Wallingford.

Approval has been asked of the securities and exchange commission, Washington, to use proceeds of the sale of additional Ludlum common to present stockholders at $21 a share to reimburse the company in part for the purchase of approximately 70 per cent of the stock of Wallingford Steel.

♦ ♦ ♦

Leon M. Dunning, formerly of the Cleveland office of the Reliance Electric & Engineering Co., has been made manager of the New England district, with offiecs at 89 Broad street, Boston.

♦ ♦ ♦

L. J. Boyer has been placed in charge of the Cleveland office of the American Sheet & Tin Plate Co., succeeding B. J. Richards, who has been transferred to Pittsburgh. Mr. Boyer formerly represented the N. & G. Taylor Co., Corrigan, McKinney Steel Co., and the Newton Steel Co. in Philadelphia.

♦ ♦ ♦

George E. Whitehurst, former industrial engineer of Illinois Steel Co., has been named to a corresponding position in the Chicago district organization of the Carnegie-Illinois Steel Corp. Mr. Whitehurst was associated with the Carnegie Steel Co. for many years, prior to his going with the United States Steel Corp. in New York in 1933. He became associated with the Illinois company early in 1935.

♦ ♦ ♦

John S. Gregg has been added to the sales staff of the Milwaukee office of the Inland Steel Co., Chicago. He was graduated from Carleton college in 1930. Before coming to Inland, he was affiliated with the Moise Steel Co., Milwaukee, in a sales capacity.

♦ ♦ ♦

Harvey B. Jordan, who has been associated with the American Steel & Wire Co., Cleveland, in various capacities for the past 18 years, has been appointed Cleveland district manager. Mr. Jordan first became identified with the iron and steel industry as chemist at the Aliquippa division of the Jones & Laughlin Steel Corp. and later at the Saxon furnaces of the Joseph E. Thropp Co., Saxon, Pa.

Following graduation from Pennsylvania State college in 1917, he joined the American Steel & Wire Co., occupying various positions at Central furnaces, Cleveland. From 1927 to 1933 Mr. Jordan served as superintendent of blast furnaces and docks. In February, 1934, he was made director of manufacturing practices and production standards, which position he held until assuming new duties Dec. 3.

Harvey B. Jordan

G. H. Peters, formerly assistant to the vice president in charge of oper-

ations, has been appointed assistant manager of this district. During his career, Mr. Peters has been superintendent of various plants throughout the Cleveland district.

♦ ♦ ♦

J. E. MacArthur has been appointed assistant general manager, in charge of national sales and service, of the Eclipse Counterbore Co., Detroit. Mr. MacArthur brings with him many years of experience, starting with apprenticeship at Brown & Sharpe Mfg. Co., and including executive positions with such firms as Pierce Arrow Motor Corp., General Motors of Canada Ltd., and recently Kearney & Trecker Milling Machine Corp., Milwaukee.

Local and Michigan sales are in charge of A. Subia, whose connection with the Eclipse company has been of several years duration.

♦ ♦ ♦

Claude Nellis, steel buyer at Ford Motor Co., Dearborn, Mich., has been confined to the Ford hospital, Detroit, with a serious ailment.

♦ ♦ ♦

Robert E. Friend, president, Nordberg Mfg. Co., Milwaukee, is visiting the company's London office for a survey of business possibilities in Europe. He will return Dec. 22.

♦ ♦ ♦

F. Price Norris Jr., formerly New England representative for Superior Steel Corp., Pittsburgh, has been appointed district manager of sales at Philadelphia.

♦ ♦ ♦

Harold A. Stewart and James R. Rogers have been elected directors of the Vulcan Mold & Iron Co., Latrobe, Pa., appointments being made to fill two vacancies.

G. E. Anderson has been elected secretary and treasurer of Vulcan.

♦ ♦ ♦

William Stringham, assistant vice president, American Rolling Mill Co., Middletown, O., has sailed for Australia, where he will spend several months contacting representatives and customers of the Armco International Corp. Accompanying Mr. Stringham is John Molloy, technical adviser for the Armco International Corp.

♦ ♦ ♦

James W. McClure has been appointed assistant auditor of the Carnegie-Illinois Steel Corp., Pittsburgh. Other appointments include: G. J. Dahlinger as chief of bureau of costs, John A. Donald as chief of bureau of depreciation and appropriations, R. L. VanCleve as assistant purchasing agent in the Pittsburgh district, and H. G. Elder as assistant purchasing agent in the Chicago district.

♦ ♦ ♦

H. H. Bushong, formerly assistant superintendent of the McDonald, O., plant of Carnegie-Illinois Steel Corp., has been named superintendent of that plant, succeeding W. D. Griffith, who was made superintendent of the bar and hoop mills of the Youngstown, O., district.

H. J. Baugh, for a number of years in charge of the bar and hoop mills in the Youngstown area, has been placed in charge of production at the Ohio works, Youngstown.

♦ ♦ ♦

Wilmer H. Cordes has been appointed manager of sales promotion and advertising, for the American Steel & Wire Co., with offices in Chicago.

Died:

R. L. HILL, sales engineer, Union Drawn Steel Co., Massillon, O., Dec. 8. Prior to taking up his work with Union Drawn Steel Co., Mr. Hill had been associated with Willys-Morrow Co., Elmira, N. Y., for 16 years, and had also been connected with National Acme Co., Cleveland. His work with the Union company took him all over the eastern half of the country, where he had gained a wide acquaintance among machine tool users and acquired a reputation as an authority on automatic screw machine operations.

♦ ♦ ♦

Robert Lincoln MacDonald, 70, identified with the pig iron sales department, Bethlehem Steel Co., Bethlehem, Pa., for more than 19 years, in that city, Nov. 28. Mr. MacDonald was a widely-known foundry adviser and technican. He was a pioneer in the development and application to foundry practice of naturally-alloyed irons. In recent years, he developed the analysis and method of production of a silvery, naturally-alloyed iron, now coming into wide use. Previous to his research work with Bethlehem, he served as superintendent, Catasauqua Castings Co., Catasauqua, Pa.; superintendent of foundry, Samuel L. Moore & Sons Co., Elizabeth, N. J.; and assistant to the general manager, Lehigh Coke Co., Bethlehem. He was a member of the American Foundrymen's association and of the American Society for Metals.

Robert Lincoln MacDonald

♦ ♦ ♦

Edward Hughes, 48, chief engineer for the Norge Corp., Detroit, in that city, Dec. 1.

♦ ♦ ♦

Emil Lepinsky, 46, vice president, Advance Boiler & Tank Co., Milwaukee, Nov. 27.

♦ ♦ ♦

John J. Miller, 77, one of the founders and secretary of the Loeffelholz Co., Milwaukee, maker of brass castings and railroad supplies, Nov. 22.

♦ ♦ ♦

Cassius C. Chaney, 48, vice president, General Refractories Co., Philadelphia, in that city, Nov. 1. He had been associated with this organization for 20 years.

♦ ♦ ♦

Frank J. Robison, 55, midwest sales manager of the Yale & Towne Mfg. Co., Philadelphia, in Milwaukee, Dec. 3. He became associated with Yale & Towne in 1918.

♦ ♦ ♦

James F. Hughes, 74, for many years just prior to the turn of the century in charge of the puddling department of the old Brown & Co. mill, Pittsburgh, in that city, Nov. 27.

♦ ♦ ♦

Robert A. Mitchell, 60, chief clerk of the Pittsburgh district sales office of Carnegie-Illinois Steel Corp., in Wilkinsburg, Pa., Nov. 14. He joined the Carnegie Steel Co. in May, 1899, and in 1913 was transferred to Pittsburgh. A year later he was named chief clerk.

♦ ♦ ♦

Fred W. Harris, 77, pioneer sheet steel authority in the Mahoning valley, in Niles, O., Nov. 25. His father, James Harris, erected the first sheet mill at Niles. He had been retired from active business for some years, being a director in local financial and civic institutions.

♦ ♦ ♦

Benjamin A. O'Neill, 84, co-founder of Schultz-O'Neill Co., Minneapolis, manufacturer of pulverizing machinery, in that city Nov. 27. With Joseph M. Schultz he started manufacturing pulverizing machinery 45 years ago, and was active in the business until his death.

EDITORIAL

Waiting for Volume Will Not Win 1936 Business

MANUFACTURERS who have good memories will recall that the recovery period following a severe depression invariably is marked by keen competition—not only in regard to price but also in point of enterprise, ingenuity and general ability to satisfy the modern needs of customers.

This has been true of every revolution of the business cycle in the past, and, because the recent depression was particularly acute and of long duration, the rivalry in the current surge of activity is proportionately severe. Proof of this fact is available to anyone who will take the trouble to compare today's leading companies in any given industrial group with those who stood in the front rank before the depression.

Comparisons of this kind show that many of the so-called old-line companies have lost ground to alert competitors. In many branches of industry, certain proud names of the past are almost meaningless today. Scores of companies which once were in the front rank of American industry are hopelessly doomed to secondary positions. In their former places of prestige and power are numerous companies which 10 years ago were practically unknown or unnoticed.

Policies Pursued in Present Recovery Period Will Shape Destinies of Many Companies

The leveling process is still in a state of flux. During the next few years—probably in greater degree than in the past two years of intermittent recovery—the destinies of competing companies will depend upon the ability of their respective managements to capitalize upon the opportunities presented by returning prosperity. The door of success still is open to those who can adapt themselves to the requirements of post-depression conditions.

What are these requirements? If one examines the seller-customer situation in the various branches of the iron, steel and metalworking industries he will find a surprising number of producers, fabricators, equipment builders and manufacturers who are trying to win 1936 business by means of the same methods they employed in 1926. Many of these sellers are playing a waiting game. They expect that returning prosperity eventually will bring a sufficient volume of business to enable them to operate profitably. While some of them undoubtedly have made efforts to improve the quality of their products, the efficiency of their operations and the effectiveness of their sales effort, far too many of them have failed to make sufficient progress in these directions to meet the challenge of 1936 competition.

It is certain that the backwardness of certain once important companies has resulted in serious losses of business which cannot be regained except by long continued, aggresive action. For instance, the failure or inability of some producers of forgings, castings, stampings and other similar products to satisfy the demands of large customers—notably automobile builders—has caused the latter to install forge shops, foundries, stamping plants, etc. as departments of their own factories.

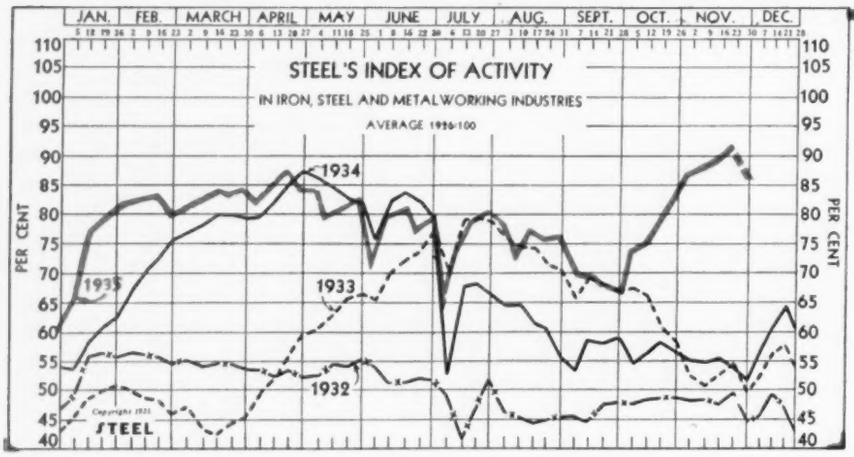
Failure of Backward Companies To Satisfy Customers Hurts Entire Industrial Group

While the immediate shock of such action is felt acutely by the backward company which lost the business, the long-term effect is to narrow the potential market for every concern in the backward company's industry. Many years may elapse before alert competitors, many of whom probably could supply the customer with better products at less cost than he can produce them in his own plant, can win back this business to its logical place.

The best weapons available to enterprising producers to ward off such losses of business in the approaching recovery period are improved products, efficient operations and good selling. Standards of 1926 are not high enough to satisfy customers of 1936. The industrial executive who thinks he can win by holding to old standards and waiting for pre-depression volume to return is due for a rude awakening. The volume will return, but the bulk of it will not go to those who waited for it. The lion's share will go to those who, instead of waiting, stepped out aggressively to win business under present conditions.

"Fair weather" manufacturers, like "snowbird" coal mine operators and Sunday automobile "tourists," present a difficult problem. However, alert competitors can be sure of one consoling fact. The higher they can elevate the average standard of their industry, the greater will be the disadvantage of those who wait for fair weather volume.

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries declined 4.7points to 86.2 in the week ending Nov. 30:*

Week ending	1935	1934	1933	1932
Sept. 14	70.1	58.7	69.1	47.8
Sept. 21	69.4	58.1	68.2	48.0
Sept. 28	68.5	59.3	66.9	47.7
Oct. 5	73.3	54.7	67.4	48.4
Oct. 12	74.9	56.4	66.0	48.7
Oct. 10	77.4	58.2	60.9	58.7
Oct. 26	82.4	56.3	58.0	48.3
Nov. 2	86.4	55.0	52.3	48.5
Nov. 9	88.4	54.9	50.7	47.7
Nov. 16	88.8	55.2	52.6	49.2
Nov. 23	90.9+	54.4	55.4	44.5
Nov. 30	86.2*	51.9	49.7	45.3

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL.) *Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.*

Current Activity Tops That of Corresponding 1929 Weeks

OBSERVANCE of the Thanksgiving holiday was reflected noticeably in STEEL'S index of industrial activity in the metalworking industries. The index for the week ending Nov. 30 stood at 86.2 as compared with 90.9 in the preceding week.

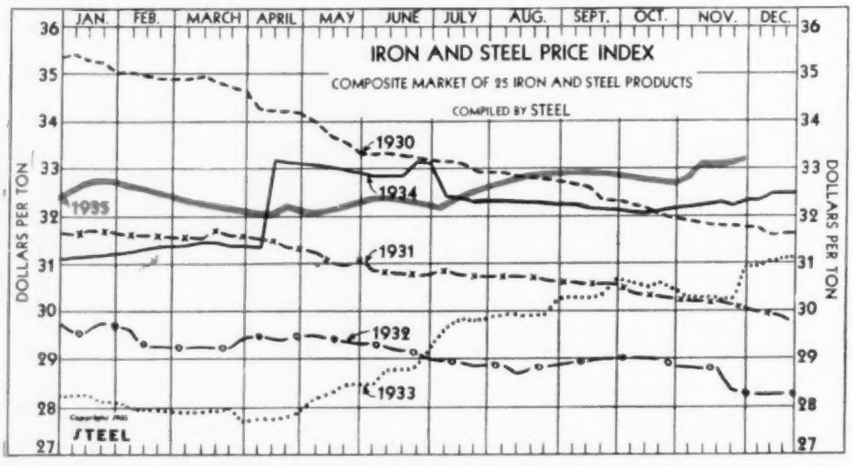
While this figure is the lowest touched by the index during November, 1935, it makes a remarkable showing when compared with the records of other Thanksgiving weeks. The current index is the highest for any Thanksgiving week since 1928.

A comparison with 1929 is interesting. In the week of that year which included Thanksgiving day the index stood at 80.9. Car loadings were 837,000; power output 1,718,000,000 kilowatt-hours; the steelworks operating rate 69 per cent and automobile assemblies 28,079. In the 1935 Thanksgiving week car loadings were about 580,300; power output 1,876,700,000 kilowatt-hours; the steel rate 56 per cent and automobile assemblies 83,358.

The comparison shows a marked change in the balance of the four barometers. In 1929 the strong factors were car loadings and steelworks operations. In 1935 the strength lay in power output and automobile production.

From now until the end of the year, comparisons of current business with that in corresponding weeks of 1929 will show to the advantage of the 1935 weeks. Early in 1936, if activity mounts above current levels, observers will be comparing current figures with those of the first-half of 1930. Once recovering business gets over the hurdle of those comparisons, we will then be ready to match records with those of the peak weeks in the pre-crash period of 1929.

1935	
Nov. 30	$33.28
Nov. 23	33.17
Nov. 16	33.16
Nov. 9	33.16
Nov. 2	32.98
Oct. 26	32.85
Oct. 19	32.83
Oct. 12	32.86
Oct. 5	$32.82
Sept. 28	32.83
Sept. 21	32.83
Sept. 14	32.81
Sept. 7	32.79
Aug. 31	32.78

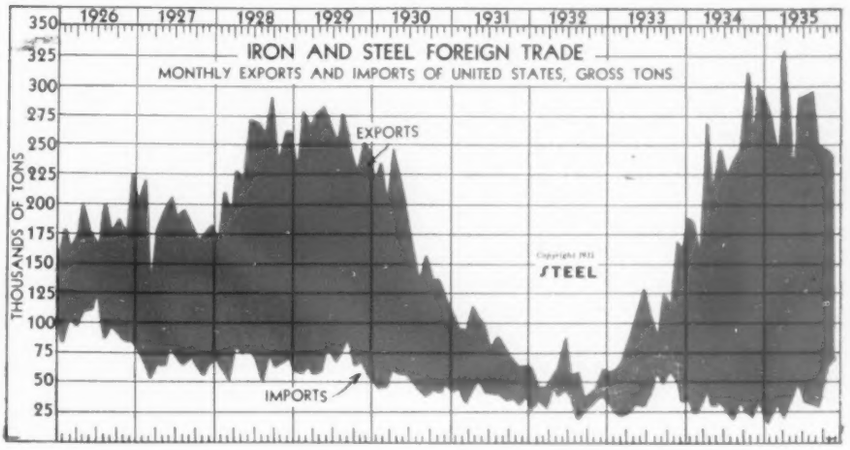


1934	
Dec. 1	$32.22
Nov. 24	32.18
Nov. 17	32.15
Nov. 10	32.13
Nov. 3	32.13
Oct. 27	32.12
Oct. 20	32.09
Oct. 13	32.09
Oct. 6	$32.09
Sept. 29	32.13
Sept. 22	32.13
Sept. 15	32.14
Sept. 8	32.17
Sept. 1	32.17

Steel Imports Gain; Exports Down Moderately

Gross Tons

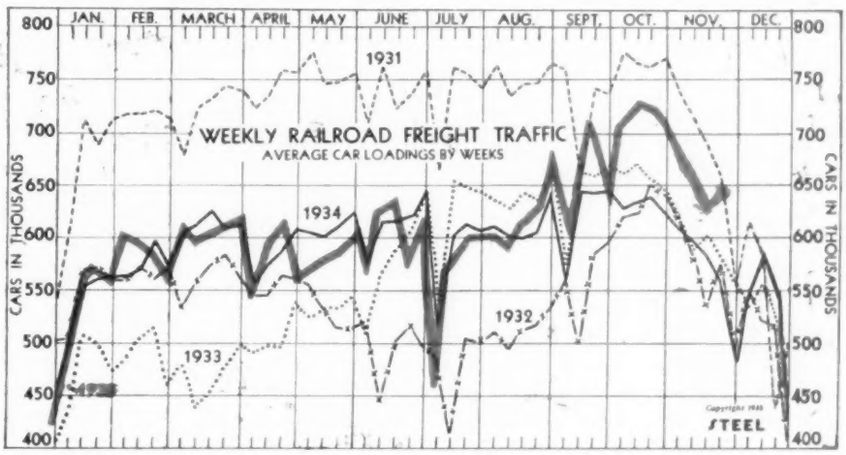
	1935 Imports	1935 Exports	1934 Imports	1934 Exports
Jan.	22,784	262,740	22,653	178,023
Feb.	28,905	228,537	25,407	151,184
Mar.	21,409	323,035	38,393	261,260
April	28,866	205,336	26,862	201,539
May	47,719	286,598	29,465	241,753
June	33,208	289,687	24,848	219,406
July	31,894	296,802	17,676	233,186
Aug.	31,312	247,312	32,418	242,947
Sept.	53,158	244,419	23,847	301,330
Oct.	59,569	238,358	22,202	220,209
Nov.	.....	.....	35,272	299,263
Dec.	.....	.....	19,708	282,655
Total	.....	.....	316,761	2,832,764



November Freight Traffic Declines Sharply

1935

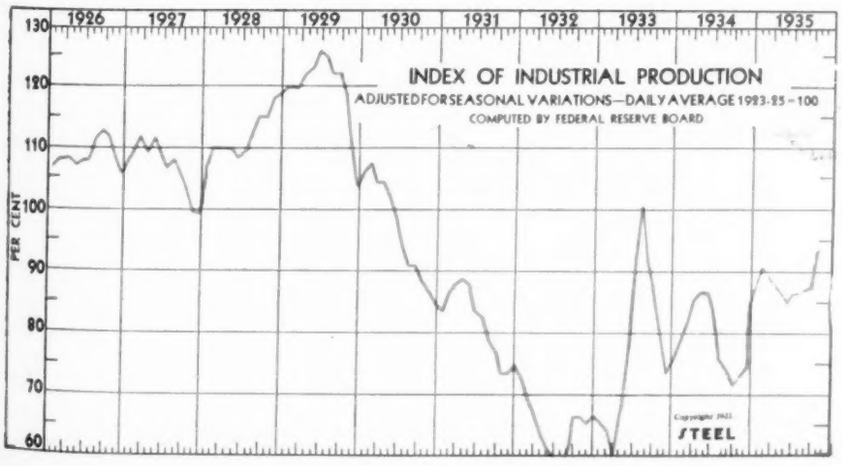
Nov. 23	646,503
Nov. 16	628,330
Nov. 9	653,525
Nov. 2	680,662
Oct. 26	707,826
Oct. 18	732,947
Oct. 12	734,274
Oct. 5	706,877
Sept. 28	630,771
Sept. 21	707,644
Sept. 14	700,356
Sept. 7	592,786
Aug. 31	679,861



1934

Nov. 24	561,942
Nov. 17	585,034
Nov. 10	594,790
Nov. 3	613,048
Oct. 27	624,808
Oct. 20	640,727
Oct. 13	636,999
Oct. 6	632,406
Sept. 29	646,084
Sept. 22	644,498
Sept. 15	647,485
Sept. 8	563,883
Sept. 1	563,883

Industrial Production Advances to 94 Per Cent



	1935	1934	1933
January	91	78	65
February	89	81	64
March	88	84	60
April	86	85	67
May	85	86	77
June	86	84	91
July	86	75	100
August	87	73	91
September	89	71	84
October	94	73	77
November	....	74	73
December	....	86	75

Continuous Wide Strip Mill Now

BY M. STONE
United Engineering & Foundry Co., Pittsburgh

DECISION of the Soviet Government to erect a modern steel mill at Zaporojie, U. S. S. R., to provide strip and sheets for the rapidly expanding automotive and other industrial plants of that country presented an opportunity for design seldom afforded. With plenty of ground space available, and without being handicapped by existing structures or equipment, and with one organization designing the entire plant, exceptionally efficient layouts and practices could be incorporated. It was the privilege of the United Engineering & Foundry Co., Pittsburgh, to design the entire sheet rolling mill plant of the Zaporojstal works in conjunction with a commission of engineers sent to the United States by the U. S. S. R. authorities.

Although certain details have not yet been settled entirely, the layout practically is complete, and construction work is well along. Although all designs and drawings are being made in the United States, a large part of the actual equipment is being made in the U. S. S. R.

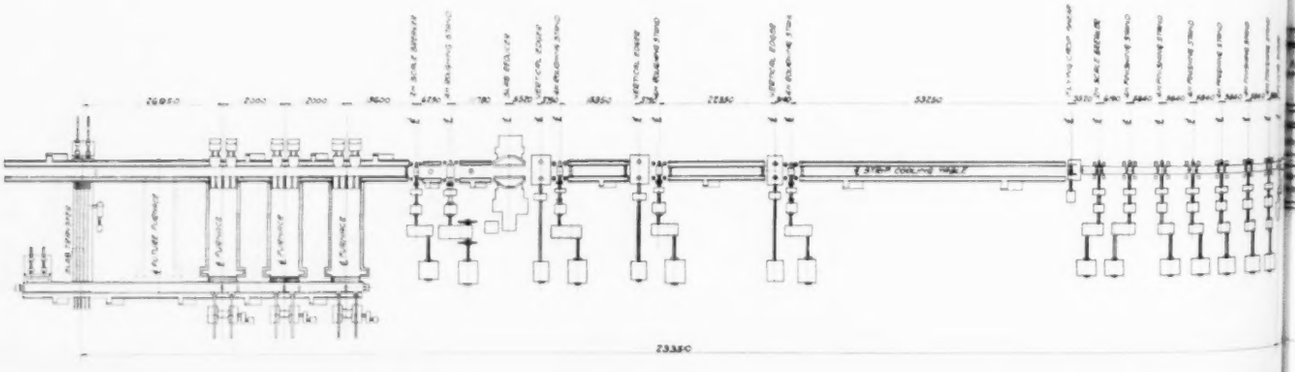
The Zaporojstal plant will cover 50 acres of ground and will house a 66-inch (1680 millimeter) continuous hot strip mill, several cold mills, and complete hot and cold strip finishing departments. The hot strip mill is designed for a yearly capacity of 600,000 metric tons (1 metric ton = 1000 kilograms — 1.105 U. S. tons), with a plant capacity of 300,000 metric tons per year of high-grade finished sheets. As it would be impossible to cover all the details in a description of this kind, this article will be confined mainly to the hot and cold mills, which are as completely roller bearing equipped as is practicable and economical. In fact, with few exceptions, the entire plant is generally antifrictionized — practically all roll necks, drives, tables, and screwdowns being equipped with antifriction bearings. Some of these bearings are being made in the U. S. S. R., others will be made by SKF Industries Inc., Philadelphia, and still others by the Timken Roller Bearing Co., Canton, O. All the larger tapered roller bearings in the Zaporojstal plant will be Timken, the larger spherical roller bearings will be SKF, and the Soviet bearing plant will furnish a number of both roller and ball bearings.

Metric System of Dimensions

As the entire plant is to operate under the metric system, all designs have been made on the metric basis, and consequently metric figures will be used throughout the article. Those who are particularly interested easily can change the metric figures into inches by dividing by 25.4.

In this mill, slabs are brought from the slabbing mill designed and built in U. S. S. R., carried across the chain transfer, and charged into the three 50-ton gas-fired reheating furnaces, which constitute the initial installation with provisions for a fourth to be installed later. From the furnaces, the slab first passes through the 2-high 710 and 1680-millimeter roughing scale breaker. When full width slabs are available, corresponding to the width of strip, all lengthwise rolling is contemplated. To permit rolling of maximum width strip, from slabs of lesser width, the first roughing stand is a 4-high 914 and 1320 x 2438-millimeter mill so that the slab can be rolled and then turned for subsequent lengthwise rolling. For such purposes, the stand is preceded and succeeded by turn tables for rotating through 90 degrees — an overhead pusher being provided on the entry side for assistance in entering the slab. Motor-operated side guards keep the slab central for rapid and smooth passage down the mill. Following the broadside mill is an electrically driven, crank type slab reducer to properly straighten and true up the slabs after broadsiding. The remainder of the roughing train is composed of three stands of 4-high mills 610 and 1240 x 1680 millimeters, each preceded by motor driven edgers.

After traversing the intermediate cooling table, described later, the strip enters the finishing train at a reduced speed, first, however, passing through a flying crop shear, which is arranged to shear off both front and back crop ends to prevent roll marking due to cold ends, etc. Next in line is a 2-high 610 x 1680-millimeter mechanical scale breaker stand, followed by six stands of 4-high finishing mills, 610 and 1240 x 1680 millimeters, which reduce the strip to its final thickness, finishing at speeds up to 1500 feet per minute. For cutting to sheet lengths, a flying shear is driven mechanically from the last stand, thus assuring great accuracy in shearing, crop control being obtained by separately accelerating and synchronously coupling the shear drum. Hot coiling is accomplished by three internal expanding coilers located some 12,000



Being Built in Russia

millimeters down the hot run table, behind which is located a depressing type piler, to receive the cut-to-length sheets at the highest mill speeds.

The hot mill proper is designed to constitute two functionally separate parts: The roughing train and the finishing train. These trains are separated by the long table referred to earlier, which is equipped with a specially designed high velocity air blast for controlling the temperature of the strip. It thus is possible to have every element at the same temperature as it enters the finishing train, thereby assuring uniform gage at all times, as well as increased production due to accelerated cooling. This is the only steel mill in Europe to which this feature has been applied and considerable interest in the proposed installation already is evident, even though the output of the Zaporojstal plant will be entirely utilized within the U. S. S. R.

Another feature embodied in the Zaporojstal mill is the use of centralized lubricating systems to cover the entire plant, reaching a total of 9000 bearings of all types and sizes. Five systems are designed to cover the hot mill alone, and three will be used to lubricate the cold mills. In all, 20 systems have been designed to insure that every bearing in the plant is supplied with the proper kind of grease and oil under pressure. All oil supplied to the gears and drives will be filtered and centrifuged and fed to the gears by sprays at the meshing points. Gear drive bearings are supplied with the same lubricant as is used for the gears proper. Visible indicators with automatic alarms are connected with all the lubricating systems to insure continuous lubrication at all times and to guard against possible damage in the unlikely event of something happening to the lubricating systems.

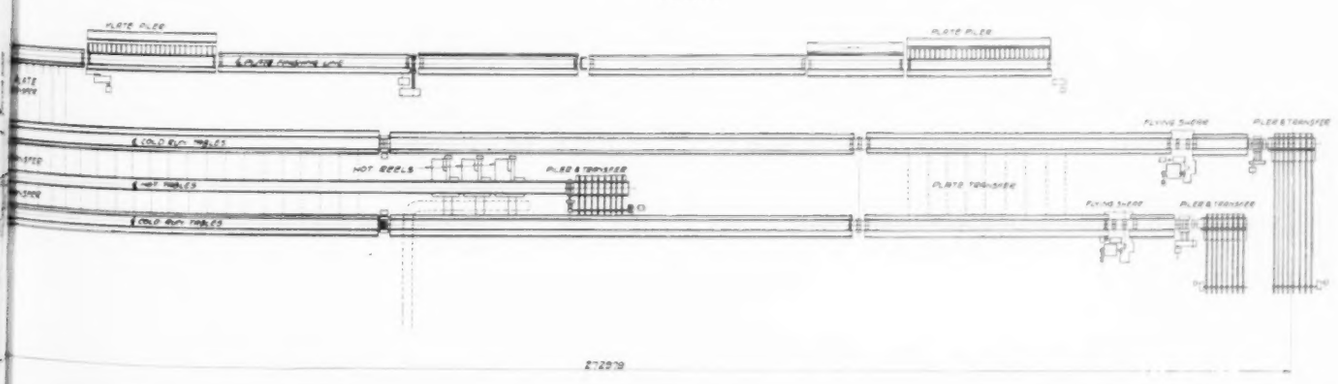
Particular attention has been given to scale removal. As the slabs enter the roughing train, they pass the mechanical scale breaker, which in conjunction with high-pressure water sprays effectively removes all primary scale. Secondary scale formed during passage through the roughing stands is removed before entry to each stand by sprays supplied with filtered water at 1000 pounds per square inch pressure. Similarly, before entering the finishing train, the material passes a second mechanical scale breaker, thus insuring a minimum of difficulty due to scale and in combination with the temperature control previously mentioned, remarkable uniformity of gage and a consistently high-quality product.

Roll Changing Speeded

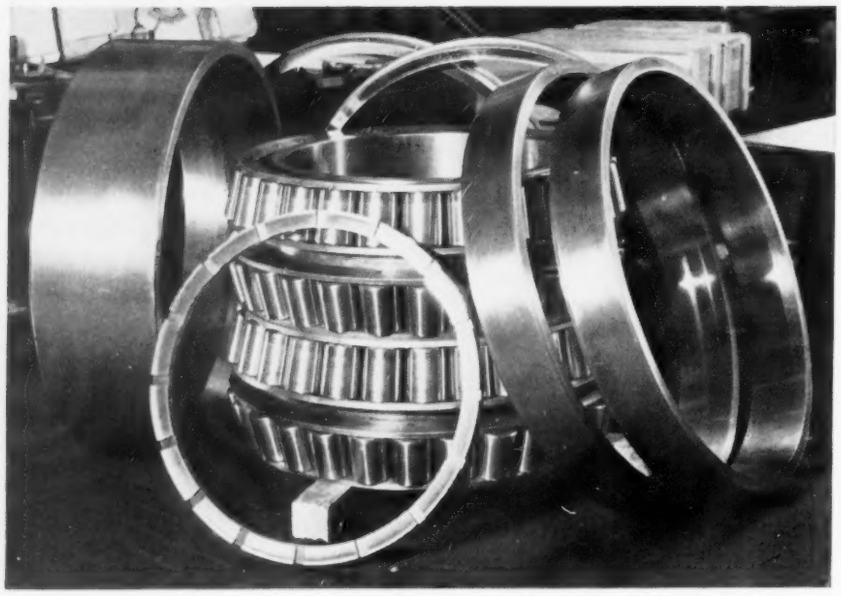
All mill roll assemblies in both the hot and cold mills are balanced hydraulically. In the design of these balance systems, rapid roll changing is facilitated by so arranging the controls that any set of work or backup rolls in any stand may be raised or lowered without affecting the pressure on the other rolls. Likewise, provision is made for the use of C-hooks in changing the work rolls, and for roll changing rigs on conveniently located tracks for complete roll assemblies. In this mill, all stands are to be equipped with indicating and recording gages to keep track of roll pressures and bearing temperatures at all times, which will be of material assistance in securing a consistently uniform product and in operating the equipment to the best advantage with regard to maintenance costs as well as quality of finished product.

As to bearings, the roughing scale breaker will be mounted on sleeve type, pressure lubricated bearings and the finishing scale breaker will be equipped with SKF spherical roller bearings. In the case of the 4-high broadside mill, Timken tapered roller bearings will be used on both the backup and work roll necks. The three stands of 4-high roughing mills will be fitted with tapered roller bearings on both the work and backup rolls, as well as the six stands of 4-high finishing mills, which practically are identical with those used in the roughing train. These mills are designed for a separating force of between 3,000,000 and 3,250,000 pounds, and the bearings are designed for an average expected life of 15,000 hours under constant operation at that loading. Longer life will ensue, of course, if the loading is decreased or the mill operation reduced.

The main electrical equipment in this plant will be built in the U. S. S. R. although many general purpose motors of various sizes will be shipped from the United States. In the case of the roughing scale breaker, a 1000-horsepower wound rotor type motor operating at 375 revolutions per minute will be used. The broadside mill will be driven by a 3000-horsepower, 214 revolutions per minute, wound rotor induction motor and flywheel, while the remaining roughing mill motors will be 3000-horsepower, 600 revolutions per minute, synchronous units. Inasmuch as the roughing stands are spaced so that the strip is completely out of one stand before it enters the next, constant speed motors can and will be used for these drives, thus affecting a substantial economy. For the short passes in the early part of the roughing reductions, excessively large sizes are avoided by



Plan view of new hot strip mill now being built at Zaporojie, Russia. The product in transit between the roughing and finishing trains will be air cooled



Typical 4-row Timken tapered roller bearing such as will be used on many of the backup roll necks

the use of induction motors and flywheels.

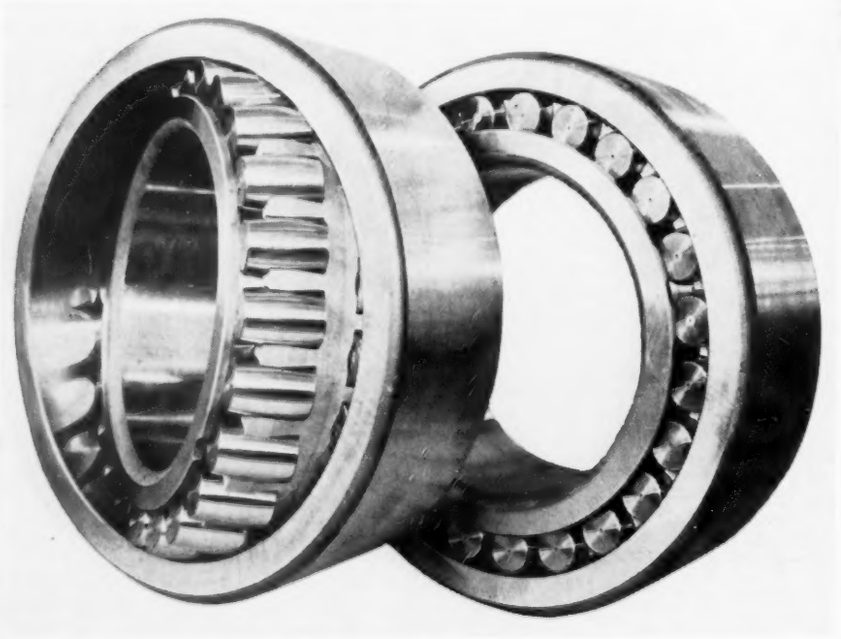
In the finishing train, however, where various reduction schedules are involved and where the strip may be in all mills simultaneously, variable speed direct-current motors with vernier adjustment are provided, all six motors being 3500-horsepower, 175/400 revolutions per minute shunt wound units. A 500-horsepower direct-current motor, operated at 250/750 revolutions per minute is provided for the finishing scale breaker. It is interesting to note that the desire to promote standardization throughout the U. S. S. R. has to a large extent dictated the use of the same size motors in all six finishing mill stands.

Tables within the mill proper ordinarily are driven by variable speed direct-current mill motors and lineshafts. However, in the case of the hot run table, where the speeds may reach 500 meters per minute, individual alternating-current motor drives are used, with variable frequency motor-generator sets for speed control. This is also the case for the cold run and plate run tables.

All main motors in the Zaporojstal plant are ventilated with filtered air from a pressure basement. Air is pumped in from the outside through especially designed filters to this pressure basement, from which it feeds out under pressure through vents leading to the various main motors, thus keeping them cooled effectively and eliminating the chance for dust causing trouble while at the same time avoiding the possibility of overheating.

The gear drives and pinion sets for this mill are of the continuous tooth herringbone type, the pinion teeth being hardened and lapped, and the cases of heavy construction. The same lubricant is both sprayed onto the meshing points for gear lubrication, and fed to the various bearings.

The bearings of all these gear sets are antifriction, with the exception of the roughing scale breaker drive and the broadside mill drive and pinion set, where space requirements dictated the use of sleeve bearings —the main mill drives proper being supplied with tapered roller bearings, while the pinion stands are furnished with spherical roller bearings.



Typical SKF spherical roller bearings such as will be installed on certain stands to be built in Russia

How Products Is Handled

Strip leaving the last stand of the finishing mill may be disposed of in either of four different ways. It may be cut to length and piled hot, or run out on the center table and coiled while still hot. Or, alternate strips may be transferred to the cold run table, or transferred to the plate finishing line.

Material, when cut to length on the main table, is piled some 140,000 millimeters away from the shear by a depressing type piler, with provision for automatically lowering the pile as it is built up. Provision is made for the material to be taken from the piler by a special crane, and subsequently covered, for purposes of self-annealing. Hot coils are transferred to the cold mill department by means of a 125,000-millimeter chain conveyor for storage or future processing.

The two cold run tables, each over 275,000 millimeters long, are believed to be the longest in the world, and are provided with the latest type of flying shears. These shears are equipped with specially designed differential gear drives and will cut strip into sheet lengths of from 1½ to 6 meters, preset and accurate in length to plus or minus ½-millimeter. Sufficient capacity is provided on these two cold run tables to handle without crowding all the metal which the hot mill can turn out when operating at capacity. As in the case of the hot run tables, after cutting to length, the material is finish-leveled and piled, the piles being transferred to the hot mill finishing department by means of continuous

chain conveyors and overhead cranes.

For the making of plate, the material is transferred to one of the cold run tables, transferred to the other at the end, returned and transferred by another chain type conveyor to the plate table — in this way, proper cooling is obtained for the heavier plates, the material ranging from 16 gage to 15 millimeters. For dividing the strip and plate into proper lengths, and also to remove crop ends, the cold run tables are provided with gate type dividing shears. On the plate finishing run, the plate is inspected on both sides by means of a turnover device, rotary side trimmed while being specially guided, cut to commercial lengths, weighed, piled, and stored or carried away by car-type conveyors or a special overhead crane.

The material in the hot finishing department may be given several types of treatment: Open annealed, pickled, skin passed, leveled, oiled and shipped; or, depending on the qualities desired, skin passed as black sheet without pickling, or pickled and skin passed without annealing. For such purposes, the equipment in this department will consist of continuous open annealing equipment, levelers and pickling and scrubbing lines of the latest design. This section of the mill also is equipped with two 4-high 420 and 1210 x 1680-millimeter skin pass mills having both work rolls and backup rolls mounted on spherical roller bearings. Supplementing this equipment, squaring and rotary slitting shears, leveling and oiling equipment and ample inspection facilities and sufficient storage space are provided. As this department was designed in conjunction with the main mill, it was possible to locate all equipment with due regard to convenience. As a result, there will be a minimum of handling required, even though several different types of processing are carried on there.

At the entrance to the cold mill department is provided ample storage space for hot rolled coils, and to insure that coils of maximum length are furnished to the cold mills at all times, specially designed coil welding equipment will be installed. Coils are taken from coil storage to the continuous strip pickling tanks. At the delivery end of these tanks, provision is being made for shears to cut the pickled coils into sheet lengths, which can be finish-leveled without transfer or unnecessary handling.

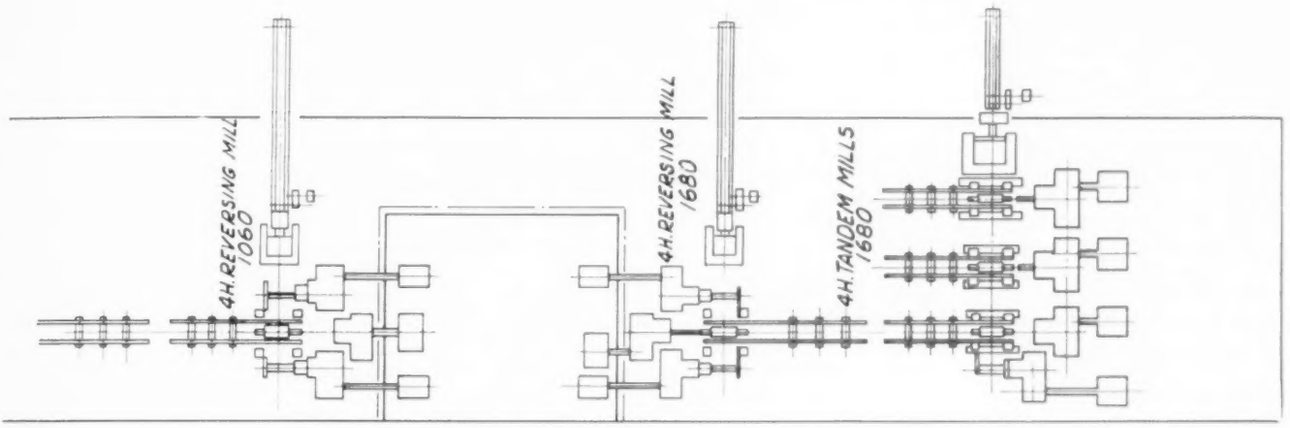
Design Is Efficient

The cold mill department of this huge Zaporojstal plant is equally well designed for the efficient processing and handling of strip. Adjacent to the pickling section is a 3-stand 4-high 1680-millimeter wide tandem cold mill designed to maintain a separating force of 3,500,000 pounds. This mill is equipped with tapered roller bearings. Two 4-high reversing cold mills, one 485 and 1370 x 1680 millimeters and the other 405 and 1240 x 1060 millimeters, mounted on spherical roller bearings are being built, the larger mill and bearings being designed to sustain an average separating force of 3,500,000 pounds, and the smaller one somewhat under 2,500,000 pounds.

Tension Is Maintained

Coils are uncoiled magnetically, the strip being kept under tension at all times — even on the first entrance. In the case of the reversing mills, both front and back tension is provided to make possible the desired accurate control of gage, which is indicated continuously by electric flying micrometers. All mills are provided with carefully controlled, circulating, flood cooling systems so as to maintain roll crowns continuously for the various schedules. As in the case of the hot mill, the cold mills will be equipped with indicating and recording bearing temperature and pressure gages, controlled hydraulic roll balance and roll changing rigs, etc.

The larger reversing 4-high mill will have a 2250-horsepower, 300/500 revolutions per minute direct-current motor, with 600-horsepower reel motors — and will have a top finishing speed of 750 feet per minute. The smaller mill will be powered with a 1500-horsepower 300/500 revolutions per minute direct-current motor and 600-horsepower reel motors, while the tandem mills will each have a 1500-horsepower 300/600 revolutions per minute direct-current motor drive, with a single reel motor of 500-horsepower capacity. The gear drives for all the cold mills, including the skin pass and tempering mills, will be of the combined drive and pinion type — the drive bearings being of the tapered roller type for the tandem cold mills, and of the spherical type for all the rest.



Layout of the two 4-high reversing cold mills and the 3-stand tandem cold mill. The strip is kept under tension at all times —even on the first entrance into the mill

Material on leaving the cold reducing mills is transferred to the processing section of the plant which is under the same roof. Here it is prepared for normalizing and annealing, provision being made for handling both sheets and coils. All annealing will be done under automatic control, the proper cycle being determined and the controllers set accordingly, thus eliminating to the great possible degree the human element. Some 24 double box annealing furnaces with automatic charging equipment are provided, with additional furnaces contemplated, as well as several of the radiant tube type portable annealing covers — with provision for proper gaseous atmospheric control for bright annealing. In addition, the processing depart-

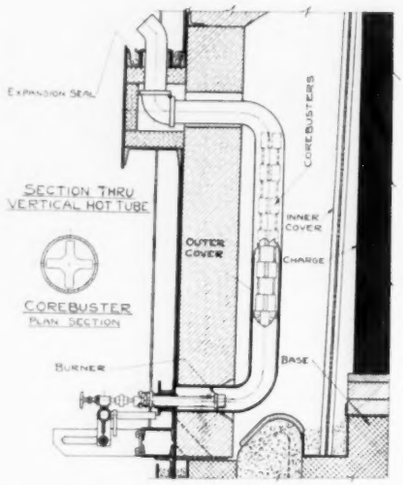
(*Please turn to Page* 57)

Improves Vertical Hot Tube Annealers for Sheets

BY LEE WILSON
President, Lee Wilson Engineering Co., Cleveland

VERTICAL hot tube bell type annealers, utilizing gas fuel, constitute one of the latest innovations in sheet mill practice. The feature of these annealers is the system of heating which consists of a series of vertical tubes located inside of the furnace but with the ends protruding through the walls. Gas burners fire into the lower ends and the hot products of combustion exit at the upper. The vertical portions of the tubes thus are heated and the heat is radiated into the interior of the furnace. The furnace proper is known as the cover, for it is lifted on and off a base by crane.

The base is loaded with a stack of sheets and the cover then is dropped down onto the base and the whole made air tight with a sand seal. These hot tubes take the place of a muffle and the furnaces supersede the old time box annealers which were rolled in and out of large brick and refractory furnaces. While only 24 months old no less than 107 of these vertical hot tube annealers already have been installed in various sheet mills. Although the use of hot tubes of this type so far has been confined to sheet steel annealers, their application to many other kinds of heating clearly is indicated.



Section through tubes showing location of refractory corebusters

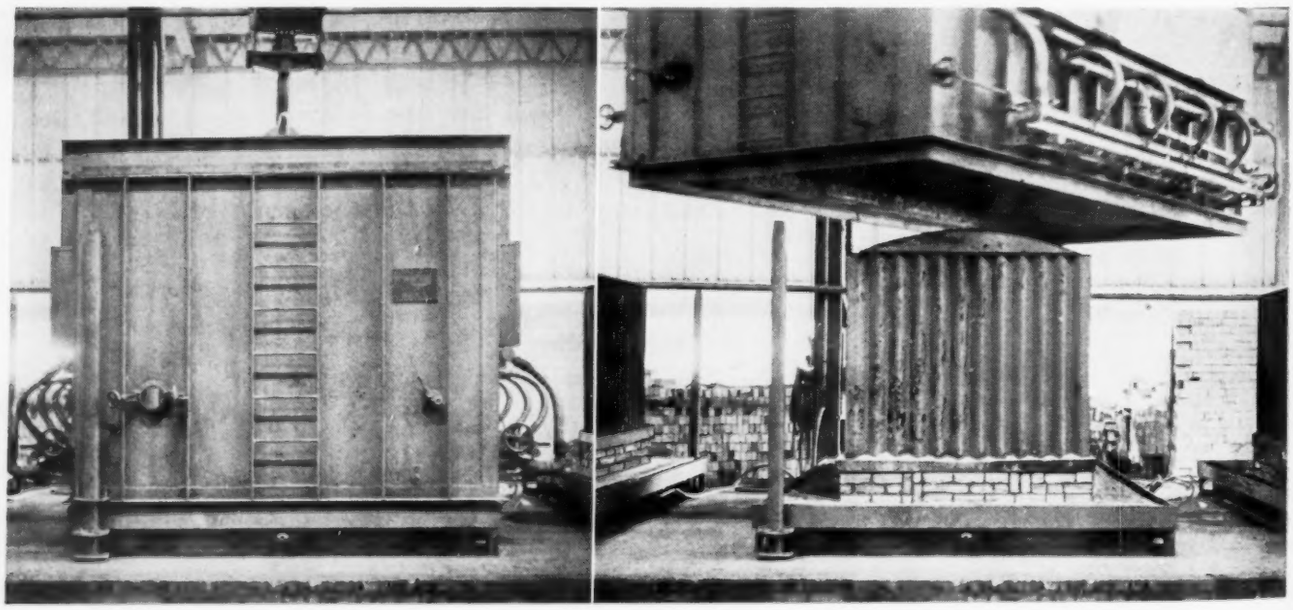
One reason for the unusual acceptance of this annealer is that the vertical heating element allows the fuel to be burned in the lower section of the tube so that a large portion of the heat liberated is radiated to the bottom of the charge where it is most needed. Another is that the first cost of the equipment is about half that of the old-style double-box furnaces and auxiliary equipment.

Sheet steel annealing is a comparatively low-temperature operation, around 1300 degrees Fahr., but these vertical hot tubes can be used on any kind of a heat treating furnace requiring much higher temperatures, up to and including 1850 degrees Fahr. These new annealers or covers are rectangular in shape and consist of a refractory shell insulated and enclosed in a gas tight steel case. They are built in six sizes to correspond to the six standard sizes of sheets, ranging from 36 to 84 inches wide and will take stacks 62 inches high.

Tubes of Chrome-Nickel Alloy

The vertical hot tubes are located on the sidewalls of the cover, 6 to 18 on a side or 12 to 36 in all, according to the size of the annealer. The hot tubes are of chrome-nickel alloy and are all alike, each being 4 inches diameter and 36 inches long between elbows, while the inlets and outlets are 3 inches diameter. They are made in three different styles using fabricated tubes with welded elbows, solid cast elbows and cast elbows welded to the tubes. The gas burners are of the blast type and fire into the lower end of the vertical hot tubes.

A new principle in effecting a greater efficiency in tube type heating is the application of refractory "core busters", a principle developed by our own organization. These are star shaped baffles, several of which are inserted within each tube to form a chain, from the upper elbow to a point about half way to the lower elbow. The dual effect of these



(Left) End view of improved type vertical tube annealer. (Right) Hot vertical tube annealing cover removed. The annealed sheets are capped with a corrugated inner cover during the cooling cycle

core busters is to cause the hot products of combustion to scour the tube thereby giving up the maximum amount of heat and at the same time, they become incandescent so that considerable additional heat is forced through the tube by radiation. A third effect of these core busters is to so baffle the tubes that the combustion is completed in the lower portion of the tube thereby concentrating the greatest amount of heat at the bottom of the furnace where it is vitally needed.

Production Is Increased

This principle of applying the heat of combustion at the bottom and utilizing the core busters to take out the maximum amount of heat from the waste gases in the upper portion of the tube results in from 20 to 25 per cent greater production. Conversely, a similar amount of fuel is saved. An actual test of two identical annealers on the same work in the same mill, one without the core busters and one with, showed a fuel consumption of 1170 cubic feet of gas per net ton of steel for the old type and only 910 cubic feet for the new.

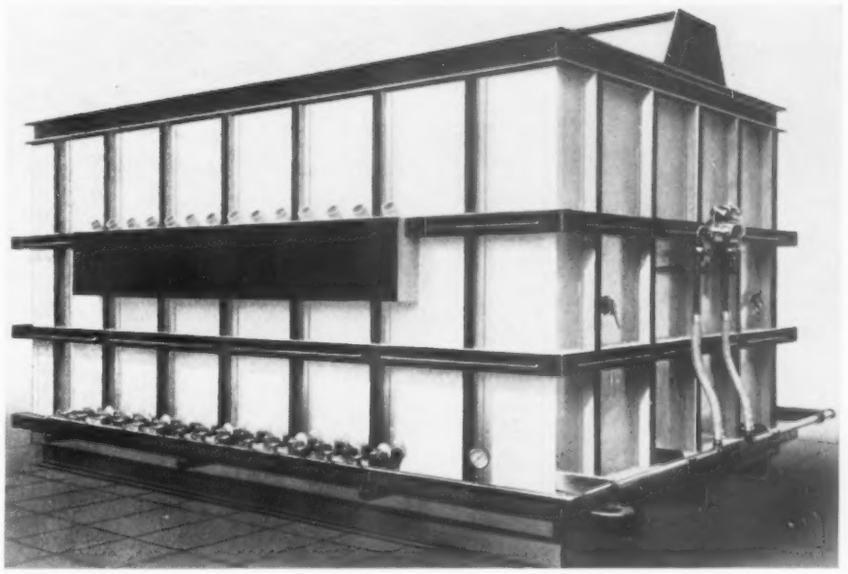
Granulated and stuck corners, sometimes acquired when heating short charges, are eliminated entirely by the use of the individually fired vertical hot tubes because it is possible to shut off the end tubes and the corner heat. During cooling the charge is protected from the atmosphere by a corrugated steel inner cover so that the outer can be used on another charge. In this way the maximum production is obtained with the least number of covers.

Throttling Control Saves Fuel

Another recent development is the use of a throttling temperature control, which proportions the volume of fuel to the actual temperature requirements of the furnace, and makes it possible to obtain, when using vertical hot tubes, the maximum efficiency from this type of annealer. As the furnace comes up to the desired temperature, the throttling control reduces slightly the volume of fuel being burned. This, in turn, reduces the temperature of the tube an equal amount top, middle and bottom, the bottom still remaining considerably hotter than the top so as to continue pushing the bottom of the charge. By the use of the throttling control, in conjunction with vertical hot tubes, it is possible to obtain automatically the desired temperature gradient between the bottom and the top of the charge, regardless of charge height or length of cycle.

While practice at different mills varies somewhat, one company using a number of these annealers, makes up charges of sheets ranging from 35,000 to 45,000 pounds each and from 30 x 96 inches to 36 x 96 inches dimension. Each charge is heated to 1300 degrees Fahr., which requires about 12 hours, and then the cover is removed and set on the next base and charge. Gas consumption runs between 1000 and 1100 cubic feet per ton without the core busters. Deep drawing stock for automobile fenders, radiator shells, cowls, etc., requires slow cooling. The foregoing practice is varied in other plants by using an inner cover. In this case the charge is heated to 1300 degrees Fahr. in the usual 12 hours, after which the burners are turned off and it is allowed to soak for 6 hours longer. At the end of this period the cover is removed, but the inner cover is left in place to protect the charge from the atmosphere until the temperature has been reduced to 300 degrees Fahr.

Lighting the newly designed vertical hot tube annealer now is accomplished by actuating a button.



New type vertical tube annealer equipped with refractory star-shaped baffles

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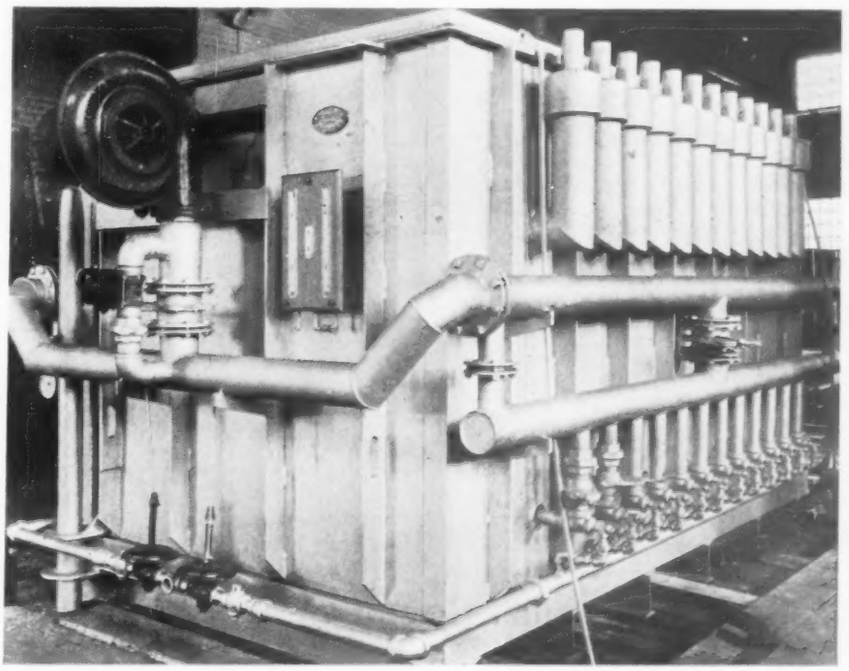
"Forged Hatchets" is the title of a simplified practice recommendation numbered R160-35 prepared by the national bureau of standards and obtainable from the superintendent of documents, Washington, at 5 cents per copy.



View of old type vertical tube annealer showing arrangement of gas burners

IMPROVING OPEN-HEARTH FURNACE DESIGN

by William C. Buell Jr.

Chapter XIII — Part II

Waste-Heat Boilers

IF PRODUCER gas is the fuel or oil or tar are used, the requirements for steam in the operation may be considerable. The generation of producer gas necessitates the addition of 600 to 1000 pounds of steam per ton of coal gasified and with indifferent operation and maintenance, or with high gasification rates the latter quantity may be increased materially. In well managed plants, over long term operations the producers being equipped with steam jet blowers a good average figure will be 800 pounds of steam per ton of coal. Producers operated with turbine driven fans may use slightly less steam.

If an open-hearth furnace produces 10 tons of ingots per hour on a fuel consumption of 500 pounds of coal as charged into the producer, and assuming the 800 pound steam rate, the average hourly steam consumption by the producer reaction will be 2000 pounds representing 58 boiler horsepower. This is for the average firing rate and peak heat input requirements will call for up to 3000 pounds of steam per hour or 87 boiler horsepower. This is about one-third of all the steam which should be generated from the waste heat under best operating conditions.

Steam Requirement Varies

The fuel oils and by-product tars ordinarily used as open-hearth fuels will weigh from 8 to 10 pounds to the gallon. The steam required for atomizing these fuels will vary from ½ to 1 pound or more per pound of fuel, or, roughly, from 5 to 10 pounds per gallon of fuel.

Liquid fuels must be heated in the storage tanks and during transmission to the control station in the service lines so as to flow freely in the pipes. At the control station the liquids should be superheated in booster heaters to the highest temperature that may be secured with the steam available, in order that the liquids may be at the lowest viscosity at the point of atomizing.

The total quantity of steam for heating the oil or tar will vary with the atmospheric temperature and other conditions, but will be from 2 to 4 pounds per gallon of liquid fuel. So the combined steam requirements for this type of firing will range from 7 to 14 pounds per gallon of fuel. Thus, with a fuel consumption of 30 gallons per ton, 10 pounds of steam per gallon of fuel and a production of 10 tons of ingots per hour, the average steam requirements will be 3000 pounds per hour, which is equal to 87 boiler horsepower. With a fuel allowance of one and one-half times that of average operation for peak periods, the maximum steam demand from a furnace producing 10 tons of ingots per hour will be 4500 pounds per hour, or 130 boiler horsepower.

As developed earlier in the chapter, this is nearly all the steam a furnace fired with liquid fuel is capable of producing, given a high order of furnace design and operation.

Used for Other Purposes

Steam will find some miscellaneous uses around the open-hearth plant. It may be used for lancing the waste-heat boilers and may be used for lancing the checkers and flues. In producer plants it may be used in connection with the burnout of the gas mains. In cold weather waste-heat steam may be used for heating water, office and wash rooms, thawing mortar, heating brick, etc. The quantities of steam thus used may be considerable in the aggregate.

The cost of the modern, horizontal fire tube boiler installation for open-hearth service, including the boilers, superheaters, exhaust fans and motors, feed pumps and feed-water heaters, as well as incidental equipment, will be about $18 to $22 per horsepower of nominal rating after

Table CXLV

General Data and Heat Balances

(Waste-heat boilers for proposed furnaces)

Detail	Line	Producer Gas	Fuel Oil
Ingot production, tons/hour	1	13.9	14.75
Fuel practice, B.t.u./ton ingots	2	5,000,000	4,000,000
Average fuel per hour	3	503,000 ft.³	394 gals.
Max. Fce. Gas, cu. ft./sec. (Fig. 185)	4	550	285
WASTE GAS TEMPERATURES			
To boiler (no excess air) deg. Fahr.	5	1350°	1250°
To boiler (prod. gas 40%, fuel oil 20% excess air) deg. Fahr.	6	1104	1052
From boilers (prod. gas 40%, fuel oil 20% excess air) deg. Fahr.	7	497	482
BOILER HEAT BALANCE—1 HOUR OPERATION, B.T.U.			
Heat to boiler (prod. gas Fig. 169, fuel oil Fig. 173) deg. Fahr.	8	28,271,000	15,523,600
Heat from boiler	9	12,776,200	6,461,600
Heat in steam	10	15,494,800	9,062,000
Pounds steam/hour (970 B.t.u./lb.)	11	16,000	9,340
Boiler horsepower/hour (34.5 lbs./bo. h.p.)	12	464	271
Boiler horsepower/ton ingots	13	33.4	18.4
Primary fuel in steam, per cent	14	22.3	15.6
Process steam, lbs.	15	2,335	3,940
Steam to feed Pumps, 5%	16	800	467
Total process steam, lbs.	17	3,135	4,407
Surplus steam, lbs.	18	12,865	4,933
Total steam	11	16,000	9,340
Boiler horsepower of surplus steam	19	373	139
Total annual steam* M lbs.	20	120,000	70,050
Annual surplus steam* M lbs.	21	96,487	36,998
Annual process steam* M lbs.	22	23,513	33,052

*7500 hours annually

installation. This is approximately two-thirds of the cost of the equivalent multipass water tube type. Furnaces producing 10 to 15 tons of ingots per average hour should be equipped with from 400 to 700 horsepower units, depending on fuel and plant conditions, which, operating at 80 per cent of rating will be capable of delivering 10,000 to 20,000 pounds of steam, f and a, per hour.

For the purpose of discussing the economics of salvage of waste heat as steam, the application of boilers is developed to the two furnaces used as the bases of improved design throughout these works. Both are of 150 tons nominal capacity, one fired with producer gas, the other with any of the fixed fuels, but now specifically considered as being fired with oil. The general data is tabulated in Table CXLV, and the developed values of the heat balances and the steam production included, and the following comments regarding certain of the items will be of service as to the methods of arriving at the results.

Temperature of Gases Varies

The total fuel, line 3, is the product of the values, line 1, times line 2, divided by the calorific values of the fuels from Figs. 169 and 173. The volumes of the furnace gases, line 4, are found through the chart, Fig. 185, to include 40 per cent excess air for the gas producer and 20 per cent for the oil operation. With no excess air present, the temperatures of the furnace gases should approximate those on line 5. However, with the quantities of excess air specified, the initial gas temperature will be those on line 6. The total heat, however, is the same in each complimentary case. For all practical calculation, the temperature of the furnace gases, after dilution with excess air, will vary inversely with the volume of the products of the process. Thus the temperature 1350 degrees Fahr., no excess air, and a fluid volume of 450 cubic feet per second, as in the producer gas example, Fig. 185, will become 1350 × 450 / 550, or 1104 degrees, after increasing to 550 cubic feet through the addition of 40 per cent excess air.

The exit temperatures, line 7, are calculated as follows: The overall efficiencies with entering gas temperatures at 1104 and 1052 degrees Fahr. are found through the curve at the upper left of Fig. 202 as 55 and 54.1 per cent, respectively, thus the initial temperatures multiplied by 100 minus per cent overall efficiency / 100 give the values used.

The boiler heat balance is developed in accordance with the principals explained in Chapter IX, and the resulting weight of the steam found.

The process steam, line 15, is calculated as follows: For producer gas operation, 420 pounds of coal per ton of ingots, 13.9 tons ingots per hour; 0.4 pounds steam per pound of coal. For oil firing, 10 pounds of steam per gallon of fuel (line 3).

The costs attendent upon operating the waste-heat boilers are scheduled in Table CXLVI. The boiler sizes (10 square feet of heating surface per nominal boiler horsepower) line 1, are from the capacities, Table CXLV, line 12, and are established upon operation at about 80 per cent or nominal rating, or 12.5 square feet of heating surface per developed boiler horsepower. The cost of the equipment installed, line 2, is $20 per nominal horsepower for the larger, and $22 for the smaller unit.

The values include the cost of the boiler, superheater valve, fan and motor, breeching and installation and a proportionate share of feed-water pumps and heaters and their installation. The annual capital costs, line 3, were placed at 16 per cent of the capital cost as developed in Chapter II of Volume I to be published later.

The boilers are taken to operate at 7500 annual hours, electric current to cost 5 mills and the larger unit to operate at an average load of 100 and the smaller at 65 kilowatt hours, and the values, line 4, were calculated from these data. The water consumption of the larger unit is calculated as 14,000 M gallons, and of the smaller 8100 M gallons, per year. The water cost is taken as 2 cents per 1000 gallons and entered in line 5.

A water tender and a helper will be required on each labor shift with any installation of from seven to 14 waste-heat boilers. On account of this requirement, the operating cost of the individual boiler will vary slightly in accordance with the number of boilers installed. This difference in operating cost is indicated, lines 11, 12 and 13.

As applied in the open-hearth, the terms waste gases, waste heat, etc., indicate gaseous fluids of no further use to the process, which having fulfilled their purpose, are to be disposed of without recourse.

How Cost Is Determined

In accordance with this economic premise the value of the heat reclaimed in the steam generated in a waste-heat boiler will be the initial cost of the heat as fuel, less the cost of its salvage.

The value of the initial heat as fuel, the cost of its salvage and the net worth of the surplus heat, which is presumed to be added to the mains of the plant steam system for credit to the open-hearth department, now may be determined through the use of the previously developed data. The schedules appropriate to the prior discussion are solved and tabulated in Table CXLVII. The total heat values, B.t.u. in the steam, line 1, are the total annual steam, thousands of pounds, line 20, Table CXLV, multiplied by 970, and divided by one million. The arbitrary value of 30 cents per million B.t.u. has been assumed throughout these works as the cost of the primary fuel of the process, and the values, line 2, have been found accordingly. The cost of salvage in a seven-furnace plant is the sum of the expense items, lines 3, 4 and 5, which are taken from Table CXLVI. Thus, if the expense, line 6, is deducted from the fuel value, line 2, the net value of the salvage, line 7, is found. The cost of steam per 1000 pounds, line 8, then is found by dividing the salvage value, line 7, by the total annual steam, line 20, Table CXLV. Thus the total value of the surplus steam, line 9, will be the surplus quantity, line 21, Table CXLV, multiplied by

Table CXLVI

Waste-Heat Boilers for Proposed Furnaces

(Capital, Operating and Labor Costs)

Detail	Line	Producer Gas	Fuel Oil
Boiler horsepower, nominal rating	1	600	400
CAPITAL ITEMS, (1 BOILER)			
Installed cost	2	$12,000	$8,800
Annual charges 16%	3	$1,920	$1,480
ANNUAL EXPENSE (1 BOILER)			
Electric current	4	$3,750	$2,333
Water	5	280	162
Repairs, 5%	6	600	440
Total Expense	7	$4,630	$2,935
ANNUAL LABOR COST (7 TO 14 BOILERS INSTALLED)			
Water tenders 8640 hrs. at 75c	8	$6,480	$6,480
Helpers 8640 hrs. at 45c	9	3,888	3,888
Total labor	10	$10,368	$10,368
LABOR COST (1 BOILER)			
7 Boilers installed	11	$1,481	$1,481
10 Boilers installed	12	$1,037	$1,037
14 Boilers installed	13	$ 741	$ 741

Table CXLVII

Waste Heat Boilers for Proposed Furnaces

Cost Schedule and Salvage Values of Waste Heat Steam (one boiler)

Detail	Line	Producer Gas	Fuel Oil
Salvaged heat in steam, Million B.t.u.	1	116,400	68,400
Value of heat as fuel at 30c/Million B.t.u.	2	$34,920	$20,530
COST OF SALVAGE 7-FURNACE PLANT			
Capital charges	3	$ 1,920	$ 1,480
Expense	4	4,630	2,935
Labor	5	1,481	1,481
Total cost of salvage	6	$ 8,031	$ 5,896
Net value of salvage	7	$26,889	$14,634
Value in steam per M lbs., cents	8	22.4	20.6
Credit in favor of Open Hearth			
Total value of surplus steam	9	$21,600	$ 7,620
Per ton of ingots, cents	10	21.6	7.0
COST OF SALVAGE 10-FURNACE PLANT			
Total cost of salvage	11	$ 7,587	$5,452
Net value of salvage	12	$27,333	$15,078
Value in steam per M lbs., cents	13	22.8	21.4
Credit in favor of Open Hearth			
Total value of surplus steam	14	$22,000	$ 7,920
Per ton of ingots, cents	15	22.0	7.2
COST OF SALVAGE 14-FURNACE PLANT			
Total cost of salvage	16	$ 7,291	$ 5,156
Net value of salvage	17	$27,692	$15,374
Value in steam per M lbs., cents	18	23.1	21.8
Credit in favor of Open Hearth			
Total value of surplus steam	19	$22,280	$ 8,065
Per ton of ingots, cents	20	22.3	7.3

the unit value, shown in line No. 8.

The credit per ton of ingots, line 10, is the value of the surplus, line 9, divided by the annual ingot tonnage of the plant. This is assumed as 100,000, and 110,000 tons for the producer gas and oil-fired furnaces, respectively.

Total Cost Not Listed

The development of the salvage value of the steam in the 10 and 14 furnace plants is carried on as just explained. The total cost of salvage, lines 11 and 16, is not detailed as they vary from the value of line 6 only in the difference in labor cost, lines 11, 12 and 13, Table CXLVI.

In the foregoing analysis surplus steam is charged to the steam department at its cost as fuel, less the cost of salvage. Therefore, the process steam used in the open hearth costs the open-hearth department at the same rate at which the surplus is sold, and profit to the open-hearth department will accrue only if the value or quantity of the surplus steam is greater than that of the process steam. A tabulation of these factors covering the several conditions discussed is given in Table CXLVIII. In this, the values of surplus steam are from Table CXLVII, lines 9, 14 and 19, and the costs of process steam, the quantities, Table CXLV, line 22, multiplied by the unit steam values, Table CXLVII, lines 8, 13 and 18.

If the open-hearth furnaces are not equipped with waste-heat boilers, the department obviously must purchase the process steam from the steam department, and thus add a considerable expense item to the cost above. With waste-heat boilers installed, this expense item is eliminated, which at the cost of steam as used would be around 4 cents per ton of ingots in producer gas operation, and considerable more in oil or tar firing. Further, and on account of the relatively large volumes of the waste gases when firing producer gas, and to a lesser degree when firing mixed or active gas fuel, the generation of waste-heat steam when these fuels are used becomes a material source of operating credit. It should be marked especially that greater quantities of surplus steam than those as calculated are positive indications of poor furnace or operating conditions.

Draft Control Important

In some plants in the past in which a substantial amount of the steam was generated in the open-hearth for service in other departments the steam engineering department has taken it as their prerogative to direct the setting of the dampers in order to secure the maximum steam delivery, often assuming the implication that the primary object of the process was the generation of steam. This condition led to much friction and spoiled steel. Today, through interdepartmental cooperation, such a condition is happily nonexistent. Usually, the water tender, properly, works under the direction and authority of the steam department, but with a strict injunction from his superior that excepting in an emergency, his sole job is to keep the boilers in the best condition possible, in order that the greatest steam delivery may be secured from the furnace gases passing. The control of draft conditions, so important to the best operation of the steelmaking process must ever be entirely under the control of the operators at the charging floor.

(To be Continued)

Table CXLVIII

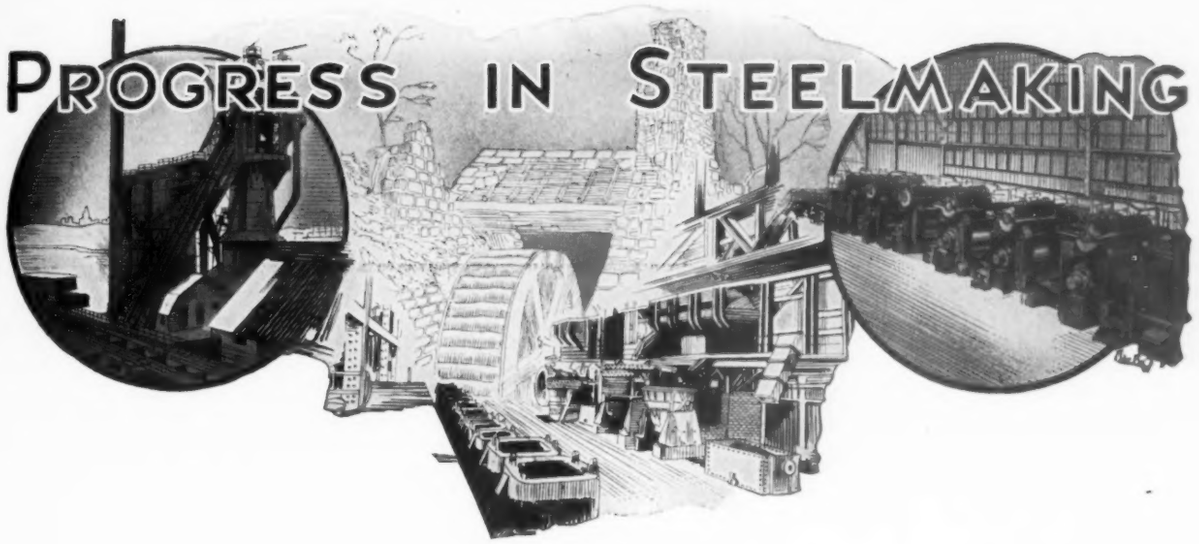
Annual Gain to Open Hearth Department from the Salvage of Waste Heat in Steam

Detail	Line	Producer Gas	Fuel Oil
7-FURNACE PLANT			
Value surplus steam	1	$21,600	$7,620
Cost process steam	2	5,237	6,809
Gain to open hearth	3	$16,363	$ 811
Net credit per ton ingots, cents	4	16.4	0.79
10-FURNACE PLANT			
Value surplus steam	5	$22,000	$7,920
Cost process steam	6	5,361	7,073
Gain to open hearth	7	$16,639	$ 847
Net credit per ton ingots, cents	8	16.6	0.78
14-FURNACE PLANT			
Value surplus steam	9	$22,280	$8,065
Cost process steam	10	5,432	7,205
Gain to open hearth	11	$16,848	$ 860
Net credit per ton ingots, cents	12	16.8	0.78

Steel Bridge Deck Weight 22 Pounds Per Square Foot

In an article, "Seattle Proves Practicality of Open Grid Decking for Bridges," presented on page 33 of the Nov. 18 issue of STEEL, it was stated that the open steel grid laid on Seattle's University bridge in 1933 weighed 2 pounds per square foot. This was a typographical error; the decking weighed 22 pounds per square foot. It was of the Irving V-special steel mesh type and was furnished by the Irving Iron Works Co., New York.

PROGRESS IN STEELMAKING



Affords Protective Coat

A transparent waterproofing liquid, which also is acid resistant, has been placed on the market. The liquid can be used on brick, cement, concrete, iron and steel, as well as an undercoat for paint, or it can be applied over paint as a protective coat. The product, composed of preoxidized oil and waterproofing materials reduced to a thin liquid state, will not crumble or crack nor will it become brittle. The mineral solvent evaporates leaving a coating that is invisible and stainless.

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Provides Liberal Passages

Improvement in a cutting and welding tip, which is designed with a system of mixing and expansion chambers in its passages, has effected savings in gas consumption ranging from 25 to 30 per cent. These savings have been made possible by minimizing the friction in the flow of gas by eliminating long narrow passages and by providing liberal gas passages especially when the gases are mixed.

• • •

Surface Hardness Higher

Adequate surface hardness of cold rolls can be obtained in alloy electrocast chilled rolls, according to a Welsh sheet mill engineer. The chill in this type roll has a martensite-cementite structure and, consequently, a higher surface hardness is obtained, such as a Shore value of 92 or a brinell value ranging from 630 to 680. Although electrocast cold rolls belong to the cast iron category in their properties they resemble more closely cast steel rolls. They have a closely and finely grained texture and the chill extends almost through the whole section of the roll, practically reaching the center. The campaign of the roll, therefore, is considerably longer than that of a steel roll of equal diameter. Rolls of this composition now are being used successfully at a number of sheet mills in England for finishing and have been found to give better surfaces to sheets than steel rolls.

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Atmosphere Is Controlled

Steel tubes now are being annealed at an Ohio plant and are given either a bright or a blued finish. Tubes to be bright finished pass through an electric furnace and a continuous cooling chamber, the atmosphere in both units being controlled. Blued finish is imparted by passing the tubes through the electric furnace and cooler and then into a gas-heated oven. Gas is employed in the bluing oven by reason of the fact that close temperature control is not necessary, the desired atmosphere for obtaining the blue finish being provided by the products of combustion.

• • •

Records Changes Quickly

Application of fixed focus radiation thermotubes has greatly extended the measurement, recording and controlling of rolling temperatures in the steel industry. Used in combination with a thyratron tube driven recorder they measure and record temperatures within a period of two seconds and temperature changes in about one second. Instruments of this type now are in use at finishing stands of hot strip mills, at roughing stands of rod mills and at the forming bell station of pipe mills for obtaining actual temperatures of the steel during reduction.

New Valve Has Many Applications at Steel Plants

FLOW CONTROL TO 1/100 OF A TURN OF THE HANDWHEEL—This is possible with a newly developed valve built with a micrometer-setting indicator, stainless steel disk and seat ring. The disk and ring are regrindable and renewable. The valves are finding application on tar and fuel oil lines at open-hearth furnaces, and on cooling water lines to air compressors. The best procedure for controlling the supply of gas on billet reheating furnaces is to set a large gas valve to give approximately the correct furnace temperature and then make the most exact temperature setting by the use of the new-type control valve installed in a bypass around the large valve. One steelmaker recently installed 128 of these units on a furnace for reheating billets. The ability of the new valve to withstand severe cutting and wire drawing action also makes it highly suitable for bleeder vents on turbine water pumps. The valve is a product of the Consolidated Ashcroft-Hancock Co. Inc., Bridgeport, Conn.

Appeals to Mechanical Engineers for Erection of a New Social Frontier

(*Continued from Page 20*)

trial demand for higher temperatures and metals to withstand high pressure at these levels.

At the metal cutting session a new type 3-component dynamometer was described in connection with a study on the turning of steel. In the machine shop session, much interest was directed to developments in modern drop forging and to surface finishes.

Discussion of the instability of metals at high temperature revealed much intensive research. R. W. Bailey, Metropolitan Vickers Electrical Co. Ltd., Manchester, England, prepared an exhaustive study of the failure of steels under creep in steam turbine parts. In his absence, the paper was presented by Professor McCullough, Worcester Polytechnic Institute, Worcester, Mass. It was brought out that fracture in general results from intercrystalline cracking. Steels showing a high resistance against the slow creep and flow are especially apt to break in this way, it was said.

Application was made of general formula to thick cylinders, pipes and tubes with and without heat flow and to centrifugally loaded parts such as turbine disks. Effect of bending and twisting moments on pipes under fluid pressure was discussed.

Present Fundamental Data

R. G. Strum, C. Dumont and F. M. Howell, research laboratories, Aluminum Co. of America, New Kensington, Pa., presented evidence to show what appears to be a basic law of creep of metals. They presented various conclusions drawn from their work with regard to susceptibility of the metal to creep, the effect of composition, rate of strain hardening and heat treatment. Their experimentation covered steel, pure aluminum aluminum alloys, copper and monel metal.

A. Nadai and E. A. Davis, research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., correlated the results of tests made under considerably varying conditions. They stated that a metallic bar might be stretched at a constant rate of deformation, or under a constant stress or in a relaxation test. It was shown that these and still other types of tests can be predicted from three fundamental creep equations based on a minimum of assumptions.

An ingenious method for determining detrimental stresses in cold drawn bars or tubes was described by C. C. Anderson, University of Michigan, Ann Arbor, Mich. The steel, it is said, was gradually dissolved in acidic solutions and the strains measured while certain portions of the specimen went into solution. The paper revealed how stresses may be reduced by different ways of annealing tubes.

Desired character of surface finishes was discussed at length in an interesting paper prepared by J. E. Kline, Hutto Machine division, Carborundum Co., Niagara Falls, N. Y., and presented in the absence of the author. The author commented on the molecular structure of surfaces, stating that infinitesimal molecular bodies were conceded to be generally globular in shape and hence could not be crowded together with no space between them. He spoke of the extremely advantageous presence of a lubricant on the surface, pointing out that oil itself is a molecular structure interposed between the contacting surfaces and becomes a ball-bearing medium.

Discussing the production of surface finishes, Mr. Kline said in his paper that the goal of modern manufacturers has been, and to a large extent still is the production of perfectly smooth surfaces by artificial means. Toward this end, attempts have been made to produce surfaces that are practically perfect, being within 5 millionths of an inch dead smooth and with a remarkable ability for reflection. In fact, he added, they are initially better than they eventually become in operation, no matter how carefully the natural run-in may have been made.

Surface Character Is Guide

Actual use of these mechanically perfect surfaces revealed, he said, that the type of surface is not as important effectually as its character. Just as the character of man is molded by heritage and environment, so also is the character of a surface formed by the tools that shape it, and lastly by its contact with contiguous surfaces.

Declaring that the cutting of materials in any manner leaves a mark, he said these marks follow the path of the cutting tool, whether the displacement of the material is accomplished by boring, reaming, broaching, grinding, honing, lapping or kindred methods. Microscopic examination of the mostly highly finished surfaces yet produced will disclose the direction of the movement used to obtain the finish. This direction of marking, he said, he chose to call the character of the surface.

Mr. Kline also discussed honed surfaces, presented examples of draw-polishing, and commented at length on finishes for engine cylinders. Ring flutter and blow-by are a result not so much of surface characteristics as of geometric shape of the bore. In practice, there is no such thing as a perfect circle, nor a perfectly round, straight bore. It is a question, he said, of how far one can go in setting up the limits of action. With properly selected honing equipment, operating on properly prepared surfaces, these limits on out-of-roundness and taper may be held commercially within a few "tenths", he said.

Danger of seizure is greatly increased in instances where surfaces are too finely finished. The nearer a so-called optical flat is approached, the nearer the surfaces come to having true molecular contact and subsequent seizure. In general, he said, three factors must be correlated when the question of finish is under consideration: Fit, run-in and lubrication.

In conclusion, Mr. Kline advocated among other points, the following: (1) Making as an objective the obtainment of affinitive surfaces possessing more nearly "run-in" characteristics, rather than absolute smoothness; (2) the importance of diametric precision relating to operating tolerances; and (3) the consequent danger of having too smothly finished surfaces when operated with insufficient running clearances. Recognition of these principles, he stated, should change the viewpoint as to the engineering ideal in surface finishes.

Not Supported by Facts

In discussion of Mr. Kline's paper, Ernest J. Abbott, president, Physicists Research Co., Ann Arbor, Mich., declared that few actual data were presented. Instead, he said, it consisted almost wholly of description and theorizing on a wide variety of items. He classified the material as follows: (1) Points which were in accord with existing data and information; (2) theories which could be contrasted with equally plausible, but opposite theories; and (3) material which he believed was decidedly contrary to existing data and information.

Among the sound points, in Mr. Abbott's opinion, were those concerning the effect of surface finish on static and running friction, the necessity of lubrication, the assertion that viscosity was not the only factor of importance in lubricants and the fact that the performance on a surface was of practical interest, rather than its appearance.

It was obviously true, he declared, that the size, direction and character of the irregularities of a surface

were determined by the finishing operations and that these factors greatly affect the suitability of a surface for its use.

Another excellent point, Mr. Abbott declared, was reference to the necessity of accurate geometry if the advantages of smooth surfaces were to be realized. Eccentricity, taper and waviness certainly affect run-in, wear and life, particularly for smooth surfaces. This point, he said, could hardly be emphasized too strongly.

Of the unsupported theories in the paper in Mr. Abbott's opinion he listed the theory that rougher surfaces are better lubricated and less liable to seizure and initial wear. He declared to the best of his knowledge the point had never been substantiated by tests. Since seizure and wear must come at points of high unit stress, it is reasonable, Mr. Abbott said, to believe that these will be minimized by smoother surfaces which distribute loads over large areas. An experiment with oiled Johansson blocks showed it was impossible to "wring them together" a week after the oiling was done.

Disagree on Surfaces

As to the theory that smooth initial surfaces were superficial, as the actual operating surfaces were much rougher, Mr. Abbott said actual measurements showed that under favorable conditions, operating surfaces were smoother than the smoothest initial surface. On the other hand, quite rough operating surfaces were obtained under unfavorable conditions.

Mr. Abbott stated it was implied in Mr. Kline's paper that the appearance of the surface, particularly its ability for reflection, is misleading, both as to smoothness and performance. It was true, Mr. Abbott thought, that reflection qualities, smoothness and performance were not synonomous, but experience indicated that they were closely related. In the absence of contrary data, it seemed likely that contradictions would be exceptions to the general rule, he remarked.

Mr. Kline's discussion of the molecular structure and the "ball bearing" mechanism of lubrication were decidedly contrary to known technical and chemical measurements, he continued. Molecular dimensions, he said, were from 100 to 10,000 times too small to play the roles assigned and since oil molecules are usually long strings, rings and other peculiar shapes they could hardly act like balls. Molecular data disapproves the statement that molecules are globular, he stated.

In conclusion, he said that after all there was no need for theorizing about surface finish. The sizes and shapes of the irregularities can be measured and the surfaces run to determine their performance. Then the operating surfaces can be measured. In this way the most favorable smoothness and character of surface for a given purpose can be determined. The industry needs data based on measurement and the means of making these measurements are now in existence, he stated.

Machinability of Steels and Drop Forging Prove Interesting Subjects

A STUDY of the turning of steel employing a new type 3-component dynamometer was presented in a paper prepared by O. W. Boston, professor, and C. E. Kraus, instructor, respectively, department of metal processing, University of Michigan, Ann Arbor, Mich. The dynamometer was described as measuring the cutting force as a function of the elasticity of its steel members. The forces are read on dial indicators and are not reported graphically. The dynamometer was developed by the authors to overcome many difficulties of calibration inherent in hydraulic recording dynamometers previously used.

In the turning of steel, the cutting force is conveniently resolved into tangential, radial and longitudinal components, it was said. The tangential component accounts for practically all the power required to remove the metal, the longitudinal component accounts for the power for feeding the tool along the cylindrical work, and the radio component holds the tool to the correct depth of cut and in so doing produces no power. The magnitude of these forces and their relation to each other varies widely for different metals. For a given material they change as the feed and depth of cut are changed or as the tool shape is changed. Only slight changes result from a change in the cutting speed.

Several Phases Are Studied

The paper covered several phases of machinability in which the three components of the cutting force were determined for various tool shapes and size of the cut. The built-up edge, its shape, size and stability was studied as a function of the cutting speed. The temperature developed at the cutting point as effected by the cutting speed was determined by thermocouple.

In a paper entitled "The Torque and Thrust of Small Drills Operating in Various Metals" Prof. Boston and W. W. Gilbert, instructor, department of metal processing, University of Michigan, presented charts which showed values of torque and thrust obtained with drills up to ½-inch diameter, when drilling nine ferrous and nonferrous metals with a 1 to 16 emulsion. They discussed the variable speed, web thickness and helix angle.

R. E. W. Harrison, Chambersburg Engineering Co., Chambersburg, Pa., in an interesting discussion on developments in drop forging and their relation to their current machine shop practice, declared that the modern forge shop, if it is to realize the efficiencies of which it is capable, must be laid out with the same care and attention to detail as that which is given to the machine shop, which handles the second phase of the manufacturing process. He also declared that the business of operating forging equipment involves expenditures at a substantial hourly rate and that it is important for the executives to so conduct their departments that the flow of work to and from the forging equipment would be in an uninterrupted stream.

Improved Forging Equipment

With the equipment produced during the last 2 years capable of an average of 30 per cent improved economy in steam consumption, plus production rates ranging from 10 to 40 per cent in excess of the rate available on forging equipment designed 5 years ago, he said that the conclusion was inescapable that the forge shop which is equipped with modern tools is in an immensely stronger commercial position.

Although modern cutting tools are capable of rapidly and precisely removing metal at rates varying from 10 to 100 per cent in excess of those 10 years ago, the fact remains, Mr. Harrison said, that high investment in this new style equipment demands that it be used in the most economical way. Hence, the forge shop equipped with precision equipment producing work with a minimum surplus of stock is probably the best and the most natural element of co-ordination in the total production scheme.

Another conclusion was that although the injection of the element of precision, minimum surplus to be machined off, metallurgical adherence to close tolerances, and the provision of physical characteristics may cause some slight increase in the cost per pound or unit per piece, the freedom from scrap, plus the material reduction in machine shop costs, makes the use of the most modern forging practice not only economically sound, but commercially necessary.

POWER DRIVES

Variable Speed Sheaves

With the development of special, variable pitch, motor sheaves and adjustable bases to adjust the belt and maintain tension as the diameter changes, constant speed, high efficiency, induction motors are to a limited extent given the advantage of variable speed. These sheaves are available in two general types.

One type is used in connection with standard multiple V-belts. In this the V's in the sheave are widened or narrowed to permit the belt to ride high or low, thus varying the pitch diameter to give 15 to 25 per cent speed variation per sheave. The changes in pitch diameters are made at the end of the sheave. Where changes are few the pitch diameter is varied by a special wrench while the drive is stationary. Tension is maintained by moving the motor on the rails.

Changing While in Motion

Sometimes speed changes are desirable during operation, as when starting at low speed and stepping up to higher speeds, for maintaining constant working speed on varying diameters of work or for other operating and processing requirements. For such drives pitch diameters are varied by a crank operating chain and sprockets, one of which is mounted on the end of the motor sheave and adjusts the sheave while in motion. A special automatic motor base is used to maintain tension.

This development is especially advantageous for use with V-belt drives where formerly sheaves of different diameters were used to meet occasional changes in speed. By using variable pitch sheaves on both shafts greater speed variations are obtained.

The other type of variable speed motor pulley is a modification of a well-known type of variable speed transmission unit using two pairs of variable-pitch, facing, cone-shaped disks and a special V-belt mounting of wood blocks with beveled ends to contact the pulleys. In this modification a single pulley with facing cone-shaped disks is used on the motor which is moved backward or forward as the cone-shaped disks are forced apart or together to vary the pitch diameter. The beveled ends of the belt drive on the special motor pulley, and the under side of the belt on the driven pulley. These units are available up to 7½ horsepower and give speed variations of 2¾ to 1 or 3 to 1, depending upon the rating.

With variable speed so easily available there is little reason for continuing operations at approximate speeds with consequent production losses.

• • •

Alloy for Reducer Gears

Until recently most attention in the manufacture of gears has been directed toward the form of the tooth and accuracy in cutting and fitting. These essential factors cannot be, and are not, neglected in the properly equipped and well-managed gear plant.

In modern plants where gear teeth, particularly those in heavy-duty speed reduction units, are subected to unusually severe shock loads, the effect of tooth impact has lately directed attention toward strength of the tooth and the material from which it is made. Even though the teeth are designed with ample strength the sharp impacts in service have a pronounced wearing and distorting effect. The cumulative result affects the life of the reducer.

Rather than increase the size of the unit or the width of the face on heavy-duty speed reducer gears and pinions built for exceptionally severe service, one prominent reducer manufacturer is using special castings of manganese - molybdenum alloy in place of the tough steel forgings ordinarily used.

• • •

Idler Bearings

Because idler bearings do not drive and are not connected directly to the power line, they sometimes are wrongly considered to be non-power consuming since "they just roll." Particularly is this the thought often given to conveyor idler roll bearings. However, nothing moves of itself and even the best antifriction bearings consume some power. Conveyor idlers have a radial load, depending upon the weight carried, and sometimes a thrust load, although the effect of speed generally can be disregarded.

On conveyors handling dusty materials, such as coal, coke, ore and foundry supplies, adequate dust seals are one of the most important parts of the idler bearings, because if the seal fails so that the lubricant escapes and dust works in the bearing soon sticks. When the idler stops rolling, power consumption is increased as the belt slides over the stationary idler. The most serious damage, however, is to the belt, because the continued friction soon wears through the idler and then presents a sharp cutting edge which may catch and tear the belt or rip out a fastener.

Flat belt idlers, and to a less extent V-belt and chain idlers, whether for changing direction or increasing tension, are also often serious trouble makers because they too sometimes are neglected since they just roll and transmit no power. However, the pressure on the bearings which is caused by belt tension consumes power and is practically equal on all bearings. (Driving and working bearings may have an additional pressure due to weight or processing roll, etc., but are usually larger to accommodate this extra working load.)

A drive is no better than its weakest part and if an idler bearing is poorly designed, under size, improperly lubricated, or neglected, it can cause much extra maintenance and seriously interfere with production. If properly designed and serviced, idler bearings practically never should cause trouble. Idler bearings may be necessary but they never need be a nuisance.

• • •

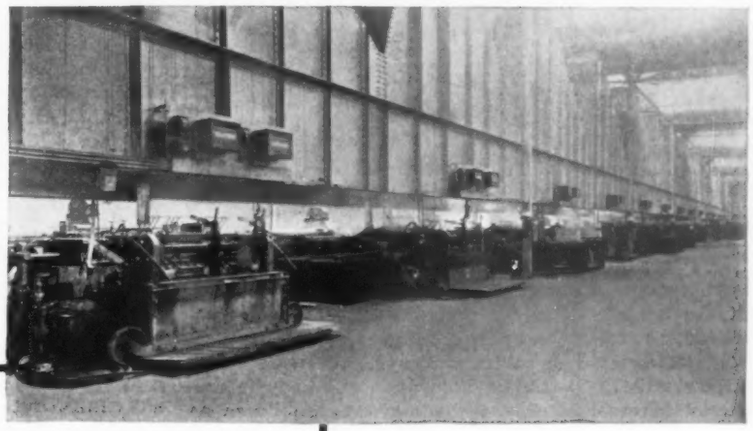
Anticipating Emergencies

The plant engineer at a well-known automotive plant and his foremen in charge of the millwrights and the electricians have gone over every key drive. This classification includes the drives that must not stop more than a few minutes at the most. The purpose was to reach a decision as to what they would do in an emergency.

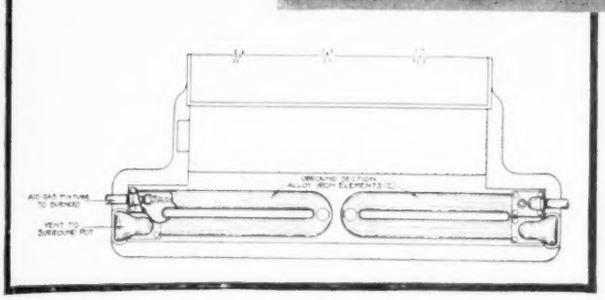
They know they can get another motor or control and what machines of lesser importance they can rob if necessary. They are in the same position as to chains and sprockets that are not stocked; belts are carried in stock except for a few special large sizes, and most of these are duplicated. They know what trouble making units can be repaired with greater speed than they can be replaced. Therefore, when an emergency develops, they are not under the necessity of wasting time in trying this and that.

This knowledge saved the day when part of the drive failed on the final assembly conveyor. This is the most important in the entire plant because its idleness not only cuts down production but within a few minutes

MODERN TIN STACKS



Tin pots in the modern tin stacks at the Indiana Harbor Works of the Inland Steel Company are equipped with KEMP Immersion Melting.



Plan view showing heating elements, positioned at feed end of pot. The efficient utilization of the products of combustion in an enclosed chamber within the metal, and without the inspiration of secondary air or the venting of noxious spent gases, is an exclusive KEMP development.

SAVE

with

Kemp Immersion Melting

The experience of Inland Steel with tin pots equipped with KEMP Immersion Melting recommends the serious consideration of every tinplate manufacturer.

KEMP Immersion Melting results in a fuel saving of 40 percent or more . . . the closest temperature regulation and control ever secured with tin pots . . . an appreciable reduction in the formation of costly dross . . . and most important of all, perhaps, KEMP has proved that the heat application need no longer be considered a limiting factor in production.

For manufacturers seeking definite, material, tangible economies, as well as the higher quality standards that are assured by accurate control, we have interesting detailed data to submit. Write **The C. M. Kemp Manufacturing Company, at 405 E. Oliver Street, Baltimore, Md., or Oliver Building, Pittsburgh, Pa.**

KEMP of BALTIMORE

blocks every other conveyor in the plant and forces hundreds of men to stop work. According to the plant engineer, planning ahead paid handsomely in this instance. An added advantage was the shortening of the period during which the engineer and his men had to listen to the sundry remarks by the foreman in charge of final assembly.

Ten Ball Bearing Commandments for Preventing Motor Difficulties

EXPERIENCE has shown that either the antifriction type of bearing or the sleeve type will give excellent service if the lubrication job is properly handled, according to a bulletin entitled "Lubrication of Bearings in Electrical Machinery," issued by Imperial Electric Co., Akron, O.

While antifriction bearings will stand up under lack of lubrication somewhat better than sleeve bearings, both types show the effects of improper lubrication whether caused by poor quality of lubrication or over-lubrication.

Dirt is particularly damaging to ball bearings and it should be kept out. Excessive grease causes heating and noise. Under normal operating conditions grease should not be added oftener than three times a year. When a ball bearing heats or is noisy some of the grease should be let out. Don't be afraid to take out most of the grease for the time being, and simply squirt a few drops of light oil on the balls, says the bulletin. This usually will stop the heating unless the bearing has been damaged by excessive temperature due to over-greasing. The bearing housings and bearings should be washed with clean gasoline once a year and should be repacked with the proper ball bearing grease.

Sleeve bearing oil wells of motors such as manufactured by the Imperial company are liberal in size and equipped with sight and level gages to make inspection and filling easy. It is, however, not practical to provide an overflow with a larger outlet hole and still keep it reasonably tight against the entrance of oil and dirt. It therefore follows that when oil is poured in at the top of the well in a large stream the inside level will be above that shown by the overflow gage. Another point which does not occur to most oilers is that when oil is poured in at the top, the bearing, shaft and housing surfaces are covered with oil which, when it all drains off, will increase the oil level.

Stop Motor Before Oiling

Oil should never be poured into a bearing housing while the motor is running unless it is impractical to shut the motor down. Due to the action of the oil ring, which dips into the well below the bearing and carries oil to the top of the shaft, the surface of the oil in the well is not level, while the motor is running. It therefore follows that gages show a false level. It should also be remembered that when the motor is running the oil grooves are full and all of the surfaces are coated with oil which drains back and raises the level when the motor stops. Therefore, if oil is poured in while the motor is running the pouring should be stopped before the gage shows that the well is full.

Over-filling of sleeve bearings results in saturated windings which destroys insulation and in the case of direct current machines also causes commutator troubles. In the case of antifriction bearings over-lubrication causes a different series of motor difficulties. As a rule antifriction bearings that are greased too liberally run hot and eventually become noisy and may fail. The excess heat caused by churning the grease increases the expansion and this expansion may destroy the bearings.

Watch Lubricant Quality

In the case of both sleeve and antifriction bearings it pays to use lubricants of good quality. Some organizations attempt to use lubricants that are just one step above kerosene. Others use oils so stiff they will hardly flow and in many cases greases are being used in antifriction bearing motors that are too heavy or that contain resin, acid or alkali hardeners. Fiber and graphite greases are not suitable for ball bearing lubrication, says the bulletin.

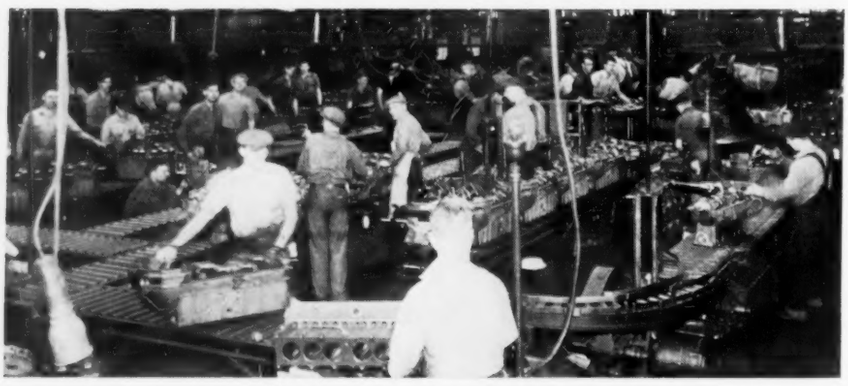
Accurate records covering a period of years in the plant of one large manufacturer who operates many thousands of motors, it is stated, show that 92 per cent of all motor failures are directly or indirectly traceable to bearing troubles. It therefore follows that the effective maintenance of electric motors is largely the problem of bearing maintenance. Proper lubrication is the first essential. Where extreme hot or cold temperatures exist it is advisable to obtain lubricating recommendations from the motor manufacturer.

The ten ball bearing commandments, says the bulletin, are:

1—Don't over-grease;
2—Fight religiously to keep dirt out of bearing cartridges;
3—Keep bulk supply of grease clean in a sealed container;
4—Don't leave container open for dust to settle on grease;
5—Wash container each time it is emptied;
6—Wipe around pipe plugs before removing from housings;
7—Handle grease with clean hands or paddle;
8—Excessive grease in housing causes more trouble than not enough;
9—Inspect bearings regularly but don't fuss with them;
10—Don't over-grease.

The drive deserves as careful and thorough consideration as the machine it operates. Neither can be successful without the other.

Conveyors Are Workbenches

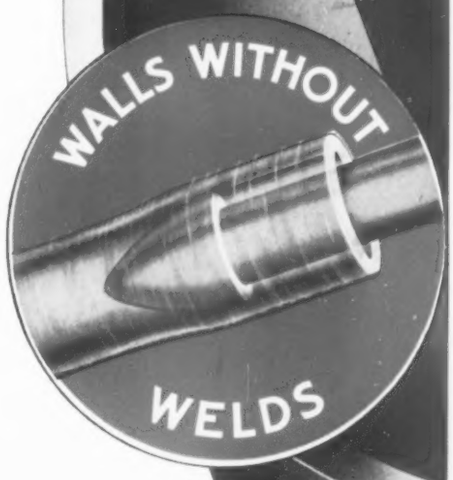


MOTOR ASSEMBLY FLOOR at a large Michigan automobile plant is equipped with roller conveyors on which cylinder blocks are shunted from one operation to another, the conveyors being used as work tables. Photo courtesy Mathews Conveyer Co., Ellwood City, Pa.

NO UNCERTAINTY about the WALL STRENGTH

Pierced from solid steel!

When a solid billet of steel is pierced to make a boiler tube, there is one thing certain—the walls of the tube will be of uniform strength. There is no weld—no long line of possible weakness. And no other method yet devised, however ingeniously employed, can provide, with invariable certainty, the structural homogeneity of a solid forging. A NATIONAL Seamless Boiler Tube is one continuous cylinder, expanded and rolled at proper and definitely controlled temperatures to produce uniform grain refinement and uniform transverse and longitudinal strength. Thus, with a seamless tube, uncertainty about wall-strength is removed—there is no need to fear that welds (there are no welds in NATIONAL Seamless) which prove air- or water-tight during regular mill tests may split or be weakened during installation or in subsequent service. For safety to life and property—for economy in service, specify NATIONAL Seamless—



America's Preferred Boiler Tubes

NATIONAL TUBE COMPANY · Pittsburgh, Pa.

Pacific Coast Distributors—COLUMBIA STEEL CO., San Francisco, Calif.
Export Distributors—UNITED STATES STEEL PRODUCTS CO., New York, N. Y.

United States Steel Corporation Subsidiary

NATIONAL BOILER TUBES

BOILER TUBES—SAFE ENDS—SUPERHEATER TUBES—CONDENSER TUBING—ARCH TUBES—SUPERHEATER PIPES—STAY-BOLT MATERIAL

MAKING STEEL PLATES FOR SPECIAL SERVICES

Bethlehem Mills Produce Many Types and Qualities to Meet Specialized Demands

Making plates to render dependable service under unusual conditions involving excessive corrosion, or wear, or extremes of temperature and pressure is an important phase of Bethlehem's service to modern industry. In making plates that are suited to the requirements of some unusual duty, interesting problems are frequently involved, calling for a degree of skill and experience far beyond that required in making plates for ordinary tasks.

For instance, an application may call for plates which will be low in thermal expansion and more than 3 in. thick, to be exposed to high temperatures and pressures. (It's harder to make thick quality plate than thin.) Another may require a special grade of welding steel, the welds to pass an X-ray inspection. Or the problem may be to obtain a still-bottom steel, for use in an oil refinery, which will withstand an increased number of temperature cycles without cracking from fatigue. Or to develop a plate that is resistant to wear, for service in equipment handling abrasive materials.

To the solution of these and kindred problems Bethlehem brings the results of experience accumulated through years of supplying quality plates to all branches of industry. Whatever service conditions may be involved, whatever properties, physical or chemical, may be called for, Bethlehem's broad experience, skilled personnel, modern facilities, insure the production of steel plates to fit the purpose.

Bethlehem metallurgists gladly study requirements and cooperate with users in determining the most suitable grade of steel plate to withstand the conditions of the intended service.

MANY TYPES OF PLATES MADE BY BETHLEHEM

To meet the varied needs of industry, Bethlehem makes a wide range of steel plates with special properties. They include the following:

COPPER-BEARING STEEL PLATES
SPECIAL ANALYSIS AND ALLOY-STEEL PLATES
ABRASIVE-RESISTING PLATES
ACID OPEN-HEARTH PLATES
FLANGE PLATES
HOT-PRESSING PLATES
FLANGE AND COLD-FLANGING PLATES
STILL-BOTTOM PLATES
LOCOMOTIVE-FIREBOX PLATES
STRUCTURAL SILICON-STEEL PLATES
HULL AND HIGH-TENSILE HULL PLATES
BOILER AND MARINE PLATES

AMONG FLANGED PRODUCTS MADE BY BETHLEHEM

Flanged and Dished Head with Large Flued Hole
Flanged and Dished Head with Flued Hole
Flanged and Dished Head with Indenture
Flanged Only Head with Banded Manhole
Heavy Gauge Elliptical Head with Flued Hole and Long Straight Flange
Manhole Saddles Bent Opposite Way

A few only of the types of flanged products produced by the Bethlehem flange shop. A.S.M.E. and A.P.I.-A.S.M.E. Heads, A.S.M.E. Elliptical Heads, Flanged-only, Standard Flanged-and-Dished Heads, Shallow-Dished and Cover Heads are among Bethlehem Flanged Products. Also Flue Holes; Manholes and Handholes, in parts or fitted complete; Saddles and Covers.

BETHLEHEM STEEL COMPANY
GENERAL OFFICES: BETHLEHEM, PA.

METHODS AND MATERIALS

Planes Speed Heavy Motor Repair Parts 3000 Miles

Previous air express records were claimed to have been shattered by a shipment of approximately 3000 pounds of stator coils and other parts recently rushed from the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to California for repair of a 900-horsepower wound-rotor hoist motor on which operation of a West Coast plant was wholly dependent.

The shipment was made in two sections, a day apart, being carried in special Stinson tri-motor planes to Cleveland and there transferred to planes of the United Airlines for the hop to California. The first shipment was received in California about 72 hours after the request for "service with a rush" was received. Normal service on such an order probably would have required 11 days—a week to fill, to get the equipment ready at East Pittsburgh and four or five days shipping time.

Co-ordinated for Speed

The damaged hoist motor was received in Westinghouse's Emeryville, Calif., works on Thursday night and repair parts were ordered from East Pittsburgh by wire Friday morning. The customer was insured for continuity of his plant operation so renewal parts were rushed through so that half of the equipment was ready Sunday for delivery to the Railway Express Agency. Airplanes did the rest.

The first lot of coils arrived at the airport in Oakland, Calif., early Monday and the rest arrived on the evening plane. The express company met each plane with a special truck and had the shipment in the Westinghouse works 30 minutes after each plane's arrival.

After the stator and rotor of the motor were rewound and the broken bracket repaired by welding and remachining, the motor left the Emeryville shop at 4:30 p.m. Friday, arriving at the owner's plant at 6:30 a.m. the next morning and was put in service that afternoon.

Express charges for the 3000-mile haul totaled $2607.

\$ \$ \$

Roof Nail Has Spiral Shank

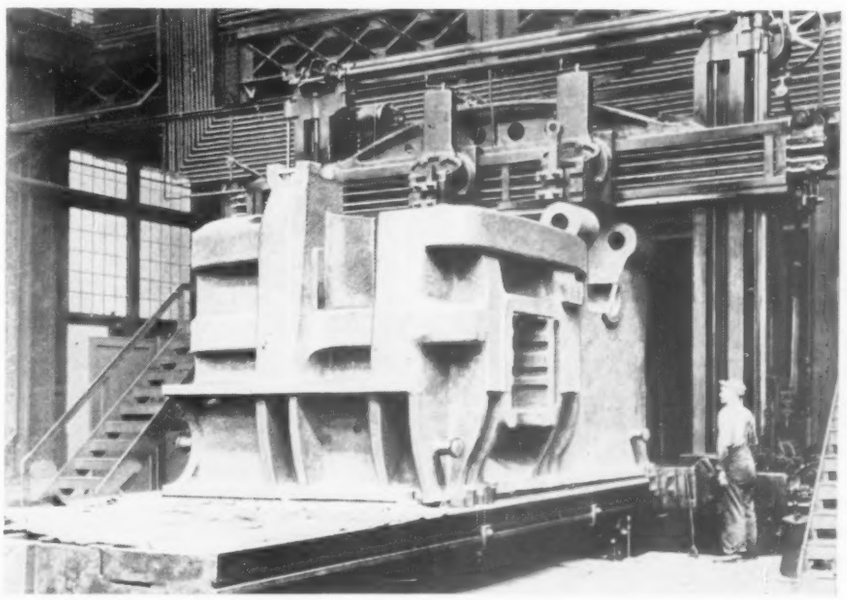
W. H. Maze Co., Peru, Ill., is experiencing considerable success with its recently patented spiral roofing nail, seven large roll roofing manufacturers now packing this nail with their product. The nail, protected from corrosion by hot-dip galvanizing, comprises the usual large flat head of roofing nails, with a shank having a high-pitch quadruple shallow concave thread over its entire length. The threaded shank provides extra gripping power when the nail has been driven and danger of the nail working loose and moisture entering under the head is minimized.

\$ \$ \$

Electric Welded Well Screens of Various Metals

Well screens for use in water wells represent a little-known use for a wide variety of metals, including Monel metal, Armco ingot iron, low-carbon steel, red brass, Everdur, copper-silicon alloy and others. The

152,000 Pounds of Cast Steel



HERE is a 76-ton steel casting for the bed of an upsetting forging machine, being machined on one of the largest planers in the plant of Allis-Chalmers Mfg. Co., Milwaukee. The casting is about 17 feet long, 11 feet wide and 9½ feet high

screens are made in diameters ranging from 3 to 18 inches and in varying lengths. Known as the "business end" of a well, screens must allow the gathering of an ample quantity of water with a minimum loss of head so that the pump is supplied with its full capacity of clear water.

Edward E. Johnson Inc., St. Paul, Minn., has developed special processes for making these screens, featuring the use of welding. Horizontal circular wires are welded to inside tapered rods to form a single, rigid unit. In welding Armco iron or steel screens, a continuous electric master-weld process makes as high as 2200 welds per minute.

Resilient Post Bracket Supports Free Cables in New Highway Guard

AN IMPROVED cable highway guard, incorporating a new type of resilient post bracket, has been introduced by the American Steel & Wire Co., Cleveland. Known as the Multisafty cable guard, this design is the result of exhaustive tests conducted by the company at its Worcester, Mass., proving ground where actual crash conditions have been studied.

Simplicity characterizes the design, installation and maintenance. Cables are affixed solidly to two end anchor posts but are free to move horizontally through the intermediate post brackets. Tension in the cables is adjusted by means of take-up bolts at the end posts without attention to the connections at the other posts, effecting a saving in time and labor.

Cables are slipped through slots provided in the post brackets and a stay pin is inserted to hold them in place. The bracket is shaped to provide flexibility under direct impact from a moving vehicle. Resiliency is specified for the steel from which the bracket is fabricated, the following chemical composition being recommended: Carbon 0.60 to 0.75 per cent; manganese 0.40 to 0.70; sulphur 0.05 maximum, and phosphorus 0.04 maximum. Hardness after tempering should range from 40 to 45 Rockwell C. Cables and fittings are protected against corrosion by galvanizing.

This type of guard offers important advantages over the simple cable and post installation, particularly in cushioning the shock of a colliding motor car and in deflecting the vehicle rather than permitting it to be halted abruptly by a post—a valuable safety provision. If the impact is so severe that some part of the car strikes the post, the post and its bracket are free to slide and can be pushed along the cables as a unit without stopping the vehicle suddenly.

Force of an impact is transmitted in tension along the cables to the anchorage. Since danger spots on highways commonly are located on fills or embankments, a free sliding cable construction permits anchorages to be located at the ends of embankments in solid ground.

As the cables are free to slide at each post connection, the slackness in the cables in sections between posts adjoining the point of impact can be drawn toward the collision point by the force of the colliding vehicle, thereby providing an added degree of resiliency to cushion the blow.

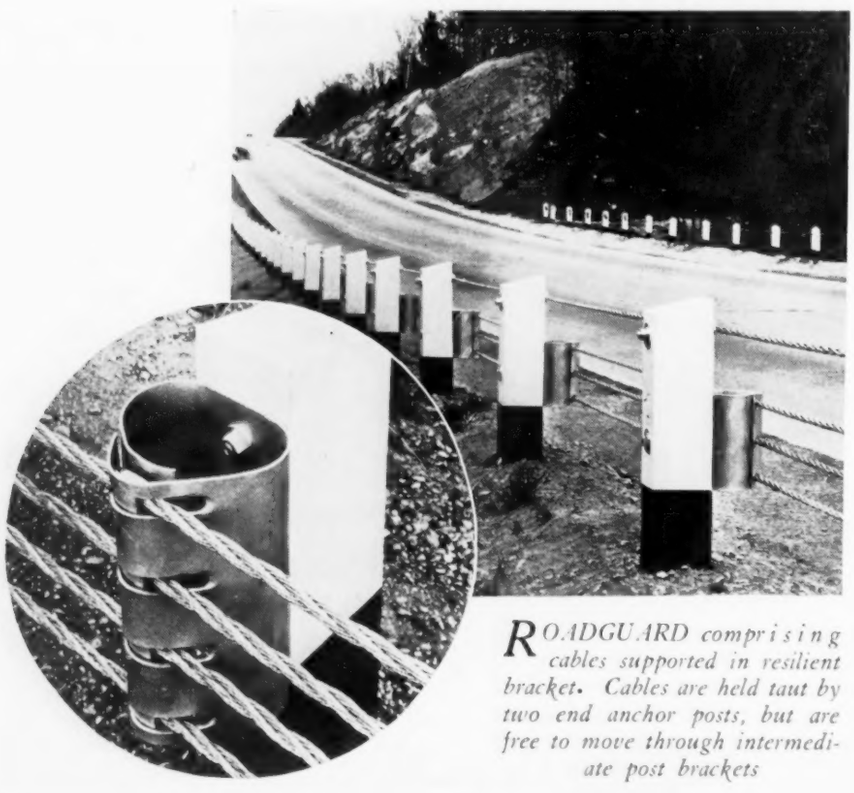
May Be Tilted on Grade

The bracket is attached to the post with a single bolt, or with two slotted holes that permit the bracket to be tilted. This is done to accommodate changes in vertical gradient, wherein it might be desired to have the post remain vertical and where the alignment of the ropes might not be at right angles to the post. Pivoting of the bracket also permits it to move in the event it should be struck by some protrusion of the colliding car.

Slots of the bracket are rounded inwardly to reduce any tendency for them to cut the cable wires during a collision. In addition, the surface of the bracket is rounded to prevent entanglement with bumpers, hubs or fenders.

Post breakage is minimized since the colliding vehicle invariably strikes a glancing blow rather than a direct one and the bracket serves as a buffer, but should replacement be necessary this is done readily without disturbing the cables. Replacing a bracket also does not disturb the cables since the latter may be withdrawn merely by removing the stay pin. Existing two-cable guards can be changed over to the new type by installing offset post brackets and adding the additional cable required. The same method may be used with wood rail guards.

A bulletin has just been issued by American Steel & Wire which gives complete specifications for the new guard, together with photographs of various installations and action pictures of actual crashes.



ROADGUARD comprising cables supported in resilient bracket. Cables are held taut by two end anchor posts, but are free to move through intermediate post brackets

Metal Cleaning Methods And Agents Are Discussed

Metal Cleaning Handbook; 213 pages, 9 x 9¼ inches, board covers; published by Magnus Chemical Co., 131 South avenue, Garwood, N. J.; supplied by STEEL, Cleveland, for $1, plus 15

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manufactured to your need

YOUNGSTOWN COKE TIN PLATE has been known for many years as a standard of high quality —Produced with the greatest care from steel made in our plants—YOUNGSTOWN "COKES" have achieved wide acceptance for a great many Tin Plate uses.

YOUNGSTOWN PLIADUC TIN PLATE—a normalized product—has merited the distinction of being preferred for a number of exacting requirements—The unique fabricating properties of PLIADUC have won for it a definite high standard in the Tin Plate Industry.

YOUNGSTOWN COLD REDUCED TIN PLATE—made on our modern four-high Cold Reduction Mill—has proved to be a superior product for many diversified applications but is best known for its remarkable drawing properties—For work requiring severe forming or deep drawing—specify YOUNGSTOWN COLD REDUCED.

Each order for Youngstown Tin Plate is specifically manufactured to meet the particular purpose for which it is purchased. Diversified manufacturing facilities enable us to meet virtually every type of requirement with complete satisfaction to the user.

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Rising importance of cleaning operations in the metal industry has been increasingly recognized in recent years and considerable research has been done in the field of detergents for such use. The present volume is a ready reference and guide for those directly interested in and concerned with metal cleaning.

Inasmuch as cleaning in most plants is not sufficiently heavy to require the full time of a metal cleaning expert it is advisable to have some reference work as a guide to improvement in process. This is one aim of this handbook. An inquiry on a business letterhead, giving official title or position will bring a copy. To others the above price will apply.

Smooth Edges on Slit Metal Coils

THIS three-high machine, for use between slitting shears and recoilers, smooths and finishes the edges of as many as eight strips simultaneously

INCREASING demand for smoothly finished edges on slit metal coils and straight strips has led to the development, by the Yoder Co., Cleveland, of a multiple strip edge conditioning machine. This machine, shown in the accompanying illustration, is an outgrowth of the single strip edge conditioner initially built for use in conjunction with the company's cold roll pipe forming machines in order to prepare the edge of the skelp or strip for electric welding.

The new machine is intended for use in installations where wide strip is received in coils and is slit into as many strips as requirements dictate. The strip comes off an uncoiler and passes through slitting shears after which the slit strips pass through the edge conditioning machine and then to a recoiler. The sharp, sheared edges left by the slitting operation are rolled smooth in the edge conditioning machine, thus permitting workmen to handle the slit material without cutting their fingers and tearing their clothing. Finished edge strip, essential for use in automatic press feed operation, may now be produced economically by means of this equipment.

In the new edge conditioning machine the edging rolls with their feed and pinch rolls are mounted on three planes which arrangement makes it possible, within a total width of 38 inches, to roll both edges of as many as eight slit strips simultaneously. It is this multiple pass feature that makes it practicable to place the edge conditioning machine between the slitting shear and the recoiler in the slitting lineup and, without rehandling, produce strips with smooth edges. Provision is made for quick change of the edging rolls to produce round or square edges and also to compensate for any variations in gage.

As a result of the development of this new machine, the round or square finished edges characteristic of hot rolled products now become commercially procurable on cold rolled slit strip. The new machine works well with any metallic materials.

A.S.T.M. Committees Report Activities To Be Undertaken During the Year

VARIOUS standing committees of the American Society for Testing Materials recently prepared statements outlining some of their major activities and projects which are under way or contemplated during 1935 and 1936. The work of several of these committees is of particular interest to the iron and steel and metalworking industries.

Committee A-1 on steel has under way the development of several new specifications, and revisions in a number of existing standards are being studied by various subgroups. Requirements for fabricated reinforcement material, wire mesh, wire mats, etc., are being developed and separate specifications for steel castings for marine use are under consideration.

Prepare Tube Standards

The insistent demand for A.S.T.M. standards to cover 4 to 6 per cent chromium steel still tubes and heat exchanger and condenser tubes has resulted in the decision of the committee to standardize requirements for these materials. In the high temperature field there has been circulated in the committee a draft of requirements for nut material for use in bolting for high-temperature or high-pressure service and action will be taken on this item during the year. Progress has been made in the committee's study on specifications for high-strength structural rivets and revisions in the existing standard specifications for structural nickel steel (A-8-29) are under way.

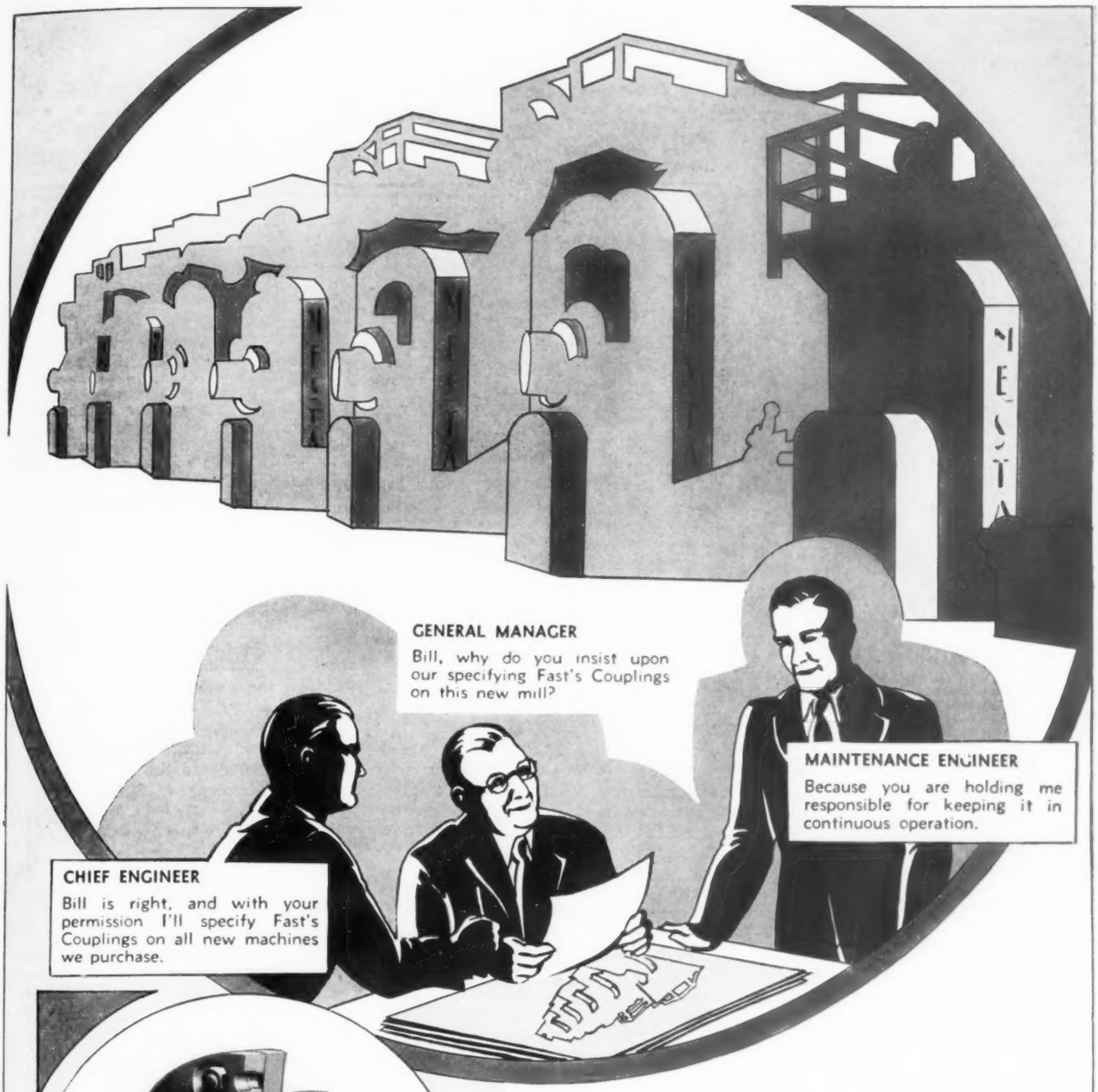
Committee A-3 on cast iron is working on a revision of the present pig iron specification and has under consideration a revised specification for cast iron car wheels. A new specification for light gray iron castings is nearing completion.

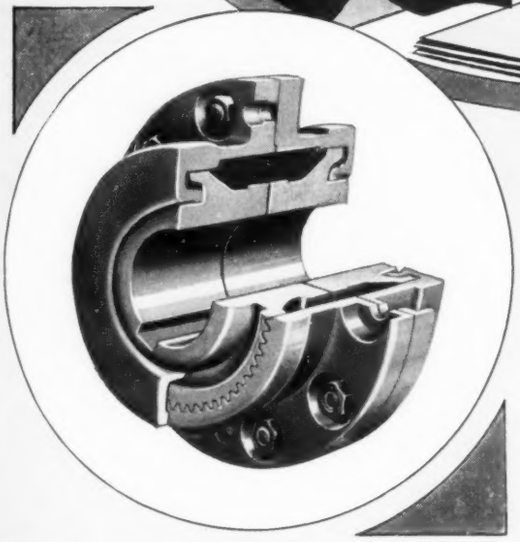
Subcommittee XIV on correlation of test bar and casting is making a study of the current specifications to harmonize the values given in these specifications for test results. The work on impact testing is continuing for the present. This comprises the development of a suitable testing machine for performing the repeated drop test.

Test Magnet Materials

Several new permanent magnet materials have been developed during the past three or four years which have coercive forces of several hundred oersteds. Some of the pereameters previously used for testing permanent magnet materials are unsuitable for these new alloys and the accuracy of others which are available are not known with any degree of certainty. Therefore, a series of these high coercive force steels is being circulated among a number of laboratories which have suitable equipment and it is hoped by committee A-6 on magnetic properties to determine from these tests the probable limits of accuracy of the various test methods available at maximum magnetizing forces of 2000 oersteds and higher.

There is a persistent demand for a standard core loss test for laminated materials at maximum induc-


GENERAL MANAGER
Bill, why do you insist upon our specifying Fast's Couplings on this new mill?
MAINTENANCE ENGINEER
Because you are holding me responsible for keeping it in continuous operation.
CHIEF ENGINEER
Bill is right, and with your permission I'll specify Fast's Couplings on all new machines we purchase.



The illustration above shows Fast's construction. No perishable materials are necessary to make it dust and moisture proof.

FAST'S PATENTS COVER THESE VITAL FEATURES

ALERT operating men are avoiding troubles by anticipating them. Since Fast's Self-Aligning Couplings were put on the market fifteen years ago, thousands of them have been installed on main rolls and auxiliary drives where they have made an enviable place in steel mill history for dependable, trouble-free operation.

These qualities are built into Fast's Couplings. The only attention they require is oiling. The contact or load carrying surfaces are protected from wear by a film of oil. This oil is kept permanently clean by Fast's rocking bearings which are located in the one position where they will make dust and moisture proof seals.

Specify genuine Fast's Self-Aligning Couplings on all machinery you purchase and avoid operating trouble.

The Bartlett Hayward Company

BALTIMORE, MARYLAND

tions higher than 14 kilogausses. Some laboratories have difficulty in making a reliable test above this induction. Therefore, a series of check samples is being circulated among various laboratories to determine the accuracy which may be expected for maximum inductions of 15 and 16 kilogausses. After these tests are completed recommendations for standard tests at these higher inductions will be considered.

After demagnetization the magnetic properties of commercial electrical sheet, particularly silicon steel, show considerable changes at very low inductions over a period from a few hours to several days. It is hoped that sufficient information will soon be available on this effect so that a standard test procedure may be specified.

Committee A-9 on ferroalloys will concentrate its work during the next year on establishing specifications for ferrophosphorus.

The subcommittee on alloys for high temperature use of committee B-4 on electrical heating, electrical resistance and electric furnace alloys has under way the development of a tension test specimen for testing cast alloys at temperatures up to 2000 degrees Fahr. It has been found necessary to describe the casting technique to insure sound casting. The specimens will be examined with X-ray and will then be tested in several laboratories at elevated temperatures.

A high-temperature bend test is also under consideration, which is intended especially for structural materials in electric furnaces. A test to determine the tendency of alloys to warp at elevated temperatures also is under consideration.

New Pyrometric Cone Series

Committee C-8 on refractories is continuing its investigation of a series of pyrometric cones of equal temperature intervals to replace the present series of unequal temperature intervals above cone No. 20. While a proposed method of test for abrasion of refractories has been developed as a result of two series of tests, it has not advanced to the stage where it can be reported.

Further studies are being made of the new type load test furnace where the load is applied direct instead of by levers. One subgroup of the committee is developing a furnace for determining the P.C.E. of high-temperature refractories.

Considerable work has been done by the committee in studying the various methods of determining heat conductivity of refractory materials and additional data are to be presented to determine the closeness with which co-operating laboratories are able to duplicate results for thermal conductivity of insulating refractories.

WELDING, et cetera . . .

BY ROBERT E. KINKEAD

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

Gold in the Scrap Heap

THE department of commerce in Washington says that in the depression the country's corporations paid out of their surpluses more than $26,000,000,000. It seems to us that this is what surpluses are for and that both their accumulation and disbursement are right and legitimate.

That is water over the dam. The problem, in many cases, is how to establish a surplus to carry over the next depression. Heavy salvage operations in personnel is a sound first step. Many thousands of extremely valuable men of ability were thrown out of their stride and are mentally and emotionally bankrupt as a result of the rigors of the depression. They may be scrapped and new ones employed just as machinery may be scrapped and new machinery bought; but there is a difference. The new machine starts producing the day it is installed. The new man starts functioning in six months to a year and it takes about two years to find out whether his choice was wise and the investment in giving him the experience justified.

An obsolete machine or process seldom can be modernized profitably. A man who is not in his dotage can be salvaged profitably if he has useful experience. The solution lies in the application of modern psychology to help him remove the mental blocks that have stopped his progress and decreased his value to himself and his employer.

No religious, sociological or moral grounds need be dragged into the picture to justify expenditures by corporations for personnel salvage. Such expenditures may be justified merely by a desire to get the most effective action in the shortest length of time at the lowest cost.

• • •

Sparks and Flashes

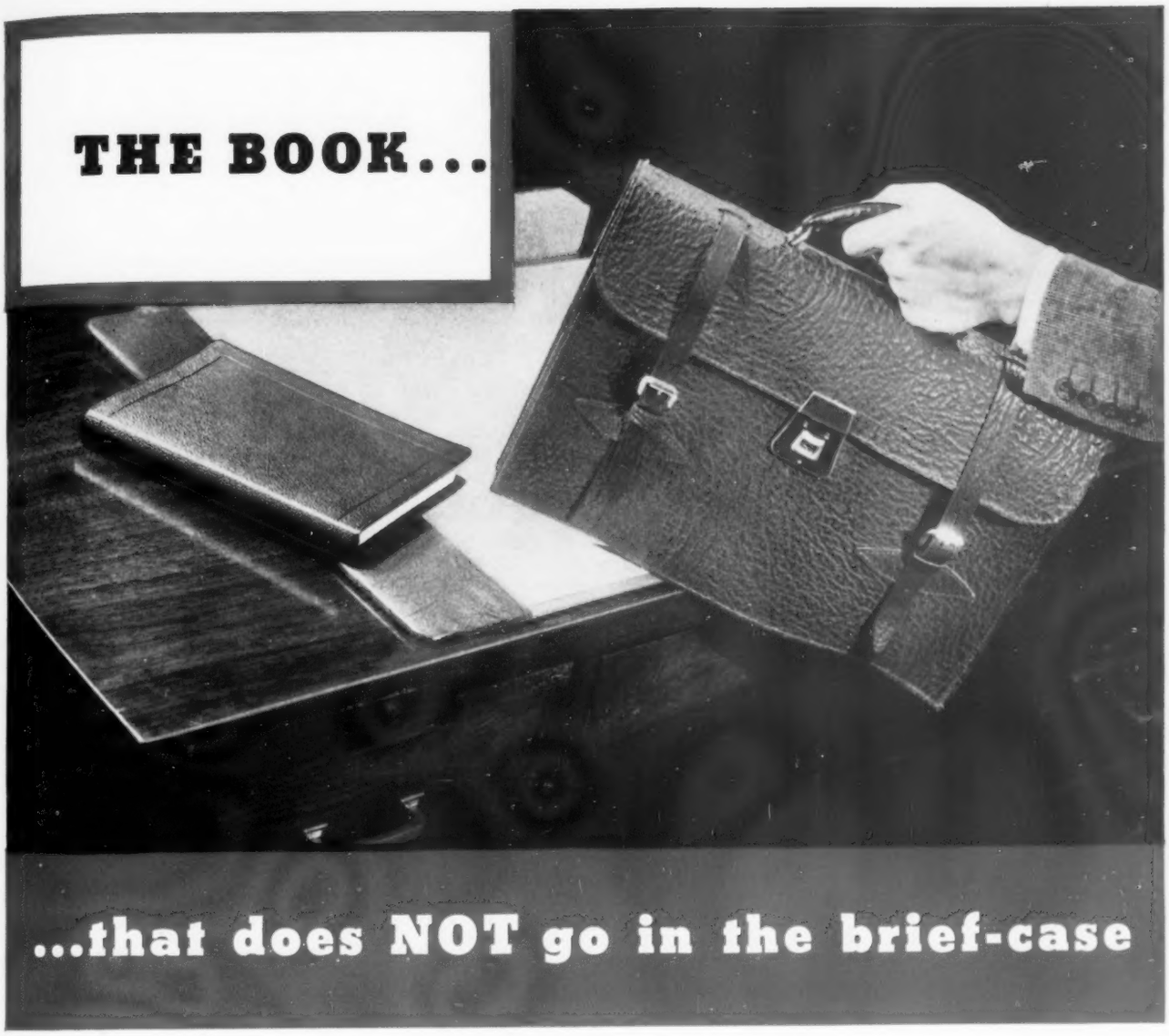
Announcement of a new steel for bank vaults in England, which it is claimed cannot be cut by any known process, leaves us cold. The electric arc will melt any metal and we will be glad to undertake the job of going through the new vault in record time if there is sufficient supply of direct-current power available in the neighborhood. It has always seemed to us that making hard steel vaults to keep money in the bank is blatant window dressing.

• • •

A man in Cleveland builds, sells and delivers, for cash, a small alternating-current arc welder to garages and tin shops. The price is less than $50. It works. This writer has welded with one of them. A supply house sells the welding rod for about 40 cents per pound. The significance of these facts seems to us to be that probably 10,000 of these outfits will be sold in the next two years and at least 10,000 mechanics will be finding new uses for welding.

• • •

As this is written, we find ourselves operating at an angle of 180 degrees with a mechanical engineer for whose professional ability we have high respect. We will both know more when we find out which one is right. Not long ago we traveled 500 miles to get the opinion of an engineer who is one of the most confirmed "No" men in the country. He commited murder and mayhem on one of our pet theories, and administered an intellectual beating that was painful. If you "can't take it" when you have it coming, the engineering profession will break your heart. But if you can take it, it is a way of life that offers rich rewards in interesting things to do.

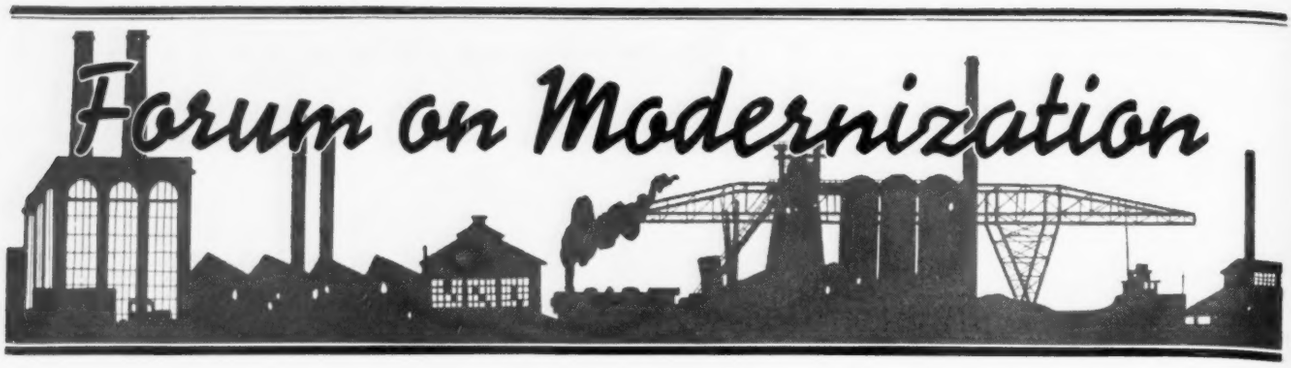


In the early days of alloy steel — when Republic was building its prestige on metallurgical service — Republic Metallurgists became known as "the men who weren't allowed to carry a price book." » » » And Republic Metallurgists don't carry price books today — because their function is to serve, not to sell. They come to your plant — to study and analyze your metallurgical or fabricating problems. Usually they are able either to improve the quality of your product or to reduce your production costs. Often they achieve both results. » » » Avail yourself of a metallurgical service that is all that the term implies. Call on Republic Metallurgists.

Republic Steel CORPORATION

ALLOY STEEL DIVISION, MASSILLON, OHIO

GENERAL OFFICES: YOUNGSTOWN, OHIO



Materials Handling Equipment Often Key to Efficient Rehabilitation

BY G. E. STRINGFELLOW
Vice President and Division Manager,
Edison Storage Battery Division,
Thomas A. Edison Inc., West Orange, N. J.

ONE trustworthy sign of business recovery in the past has always been an improvement in the efficiency of industrial production and its result, directly and indirectly, of enabling industry to manufacture a better product and to sell it at lower cost. Achieved during the early stages of recovery, when operations are well below capacity, gains in production efficiency have not only been a stimulus to larger volume, but they have also operated to improve earning power rapidly as volume grew.

Indicating as it does that interest in more efficient production has grown more active than for many years, the large attendance at the recent Machine Tool Show in Cleveland is distinctly encouraging.

Federal Funds Available

It is encouraging also that the federal government has adapted the National Housing Act to the guaranteeing of plant modernization loans, making sums up to $50,000 available on loans under government guarantee. The favorable terms of these modernization loans make it entirely possible to install improvements which can pay for themselves within the period of the obligation.

It is clear that any survey of the possibilities for plant modernization must, in order to be complete, include not merely the individual manufacturing processes but also the transportation of materials between them, as well as all transportation between receiving, shipping and storage points within the plant. Plant transportation and materials handling operations need to be synchronized with the production operations. In fact, it is impossible to realize the full benefits of improved production machinery unless it can be kept supplied with work; and this implies a corresponding improvement in materials handling equipment.

Numerous types of materials handling equipment are available, both fixed and mobile, each serving a definite need. The best arrangement in an individual plant is often a combination of both. However, the mobile type of equipment, as represented by the electric industrial truck and tractor, is adaptable to a wide range of conditions. It can travel wherever floors and clearances permit, the same unit often serving for the unloading of incoming cars, the loading of outgoing cars and for virtually every materials handling operation between. Thus, it is often the first type of unit adopted by the plant which is applying modern materials handling equipment for the first time.

The first great impetus to the use of the electric industrial truck was supplied by the World war. Since then its applications have multiplied. Today it is available in a wide variety of models capable of picking up and setting down its loads as well as carrying them.

Shipments of new electric industrial trucks and tractors have increased much more rapidly from the low point reached during 1932 than has industrial production in general, thus indicating continued recognition by industry of the importance of efficient materials handling. These shipments, however, went mainly to plants which were already large users of this type of equipment.

Investigation discloses that once adopted by an industrial plant, this equipment becomes a permanent part of its operations. On the other hand, a study made during the latter part of 1928 of the materials handling operations of some 300 plants showed that nearly two-thirds of them had up to that time not adopted any kind of power equipment.

In such plants, modern materials handling equipment frequently returns enormous profits on the investment. The initial installation of electric industrial trucks and tractors has often in the past been entirely amortized out of savings in less than a year.

Physical Restrictions Hinder

Where electric industrial trucks and tractors have not yet been adopted, the reasons given have sometimes been that there is not enough work to justify the investment or that the character of the material does not lend itself to this method of handling. More often, however, the reasons lie in the physical conditions within the plant. They include such items as inadequate clearances in aisles, passageways and doors, elevators too small, and bad floors. Thus, in any program of modernization to be considered at this time, improvement in these physical conditions appears to offer particularly bright opportunities for more efficient production.

Modern materials handling equipment makes numerous important savings in addition to the reduction in handling costs alone. High-lift tiering and fork trucks, for example, sometimes double or even triple the available storage space by stacking merchandise units higher than is practical by hand. This permits more compact storage, reducing the distances, and there are also many instances in which it has obviated

the need for the construction of additional warehouses.

Another important saving arises from reduced damage or breakage of materials and parts. Compared with hand trucking, suitably designed electric trucks have reduced scratching and corner bending of steel sheet during the loading of cars; they have also made it possible to load in larger packages which permit more effective bracing and reduce damage in transit. In some cases the savings have amounted to more than $3 a ton.

Reduction in idle machine hours, car demurrage, insurance rates and compensation claims are still other sources of savings.

Sir Robert Hadfield Has Paper at French Congress

A comprehensive paper discussing "Recent Progress in Special Steels" was presented by Sir Robert Hadfield, London, before the Congres International des Mines de la Metallurgie et de la Geologie Appliquee held at the Sorbonne, Paris, Oct. 20-26.

This contribution, covering the period of a decade, consisted of two principal parts, the progress in practical applications of alloy steels and advances in scientific metallurgy. In presenting the paper, Sir Robert paid high tribute to French metallurgists. As appendices to the text, the author listed publications of Prof. A. Portevin during the period 1925-1935 relating to special steels and the scientific publications of Prof. P. Chevenard.

Continuous Wide Strip Mill Is Being Built in Russia

(*Concluded from Page 35*)

ment has annealing and normalizing furnaces, pickling, scrubbing and drying equipment for the normalized material, together with flying shears, side trimming machines, and roller levelers.

The planishing department of the cold mill consists of a series of seven planishing and tempering mills: Two 4-high sheet planishers, 405 and 1210 x 1680 millimeters; four 2-high 685 x 1060 millimeters planishing units; and one 4-high coil planisher, 405 and 1210 x 1680 millimeters. The design of these mills is similar to the others described earlier in the article, except the rolling is done dry to prevent surface blemishes. All backup and work roll necks on these mills will be equipped with spherical roller bearings and each mill will have its own motor drive. For the production of still wider sheets, a 2140-millimeter 4-high reversing cold mill is being contemplated for cross rolling.

It is planned to have the leveling and stretching department run parallel to the cold mill planishing department. Here will be located at convenient places some ten squaring shears, several stretcher and roller leveling equipments, sheet and coil slitters, oiling roller equipments, inspection tables, etc.

Little Handling Required

A consistent and unique feature of this Zaporojstal plant is the fact that each department has its own storage warehouse — thus minimizing the amount of handling required and accelerating whatever handling is necessary. Accurate stock control is aided materially by the use of automatic recording scales in each warehouse. Conveyors, cranes, hoists, etc., are being installed on a liberal basis throughout the plant, and at no place will human labor be required to do work that can be more easily and more effectively done mechanically. Roll and repair shops and spare part storage all are located conveniently with regard to the department which they serve. In addition to a careful study of the mechanical equipment involved, equally detailed consideration also was given in the design of the Zaporojstal plant to matters pertaining to working conditions. Proper and effective lighting, the securing of correct building temperatures for comfortable working, both summer and winter, good ventilation, proper height and lighting of inspection tables, etc., were all given special attention. Water supplies, oil, gas, and power lines were co-ordinated, and as a result, every step in the manufacture of the product advances in the most logical and most efficient and easiest manner.

The co-ordinated design, all under the supervision of the United Engineering & Foundry Co., makes it possible for equipment to be built in widely separated locations, yet be assembled in orderly fashion at Zaporojstal. Likewise, the design of the plant and equipment is such that no difficulty is anticipated in starting operations in the U. S. S. R. with practically a complete staff of Russian workers, particularly as many of the workers have been trained in steel mills in other countries.

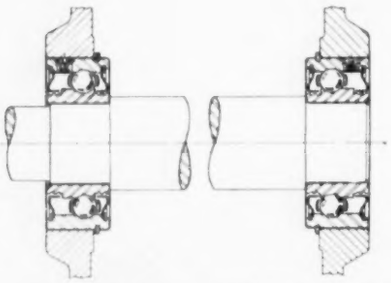
One Crane Does Work of Two

WITH revival of activity among the manufacturers of farm equipment, more economical handling methods are coming to the front. This scene, taken at one of the large plants, shows a crane that has both grab bucket and magnet handling hoists combined on a single trolley. Bins are arranged between the runways in such a manner as to enable the crane, carrying a bucket load of coke or sand to pick up a magnet load of pig iron and carry it at the same time to the charging platform. All materials are unloaded from cars expeditiously and scrap can also be sorted and stored in like manner with the least amount of help on the ground. This crane, built by Harnischfeger Corp., Milwaukee, is equipped for fast operation with conservatively rated slow-speed crane motors. It is a five-motor unit with operating speeds as follows: Bucket hoist, 140 feet; Magnet hoist, 65 to 130 feet; bridge travel, 325 to 375 feet; trolley, 150 to 200 feet. All hoist and bridge travel motors are equipped with 1000 foot-pound capacity clamshell brakes and the trolley motor with an 80 foot-pound pedal brake

NEW EQUIPMENT

Completely Enclosed Cartridge Type Ball Bearing—

Norma-Hoffmann Bearings Corp., Stamford, Conn., is bringing out a completely enclosed cartridge type precision ball bearing designated as the "3000" series. Although having but one row of balls, inner and outer rings are of standard double-row width. The bearing, shown herewith, is protected on both sides by metal seals held firmly in place by snap rings in the outer race. Advantages provided by wide inner and outer rings include exceptionally large grease capacity sufficient for long periods of continuous operation,



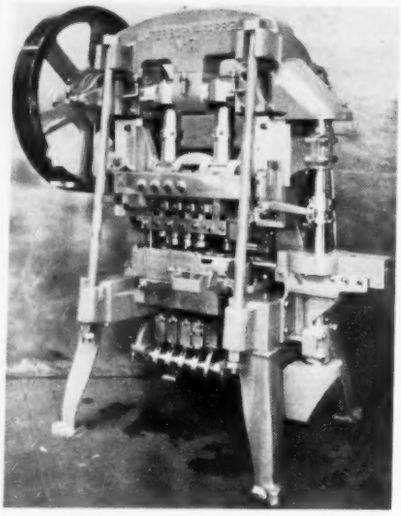
Norma-Hoffmann completely enclosed cartridge type ball bearing

and elimination of looseness or "peening" of either shaft or housing by the greater contact area the wide rings afford. The bearing is made chiefly in the medium series starting at 25 m/m bore.

♦ ♦ ♦

Automatic Transfer Press—

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., is offering a new transfer press. As shown in the illustration herewith, it is equipped with tools for performing five operations successfully. The unit is ideal for quantity production of work requiring several operations where the depth of draw is not over ¾-inch. The coil of strip metal is supported on a floor reel directly in front of the first or blanking station. Tools are built in a long die set which includes the carry bar. The advantage of this arrangement rests in the fact that the complete tools for each job can be handled as a unit. Scrap may be cut



Automatic transfer press built by Waterbury Farrel Foundry & Machine Co.

into short pieces for cabbaging, by use of a scrap cutter attachment, or wound into a coil by a scrap winder driven from the press. Either one or two rows of blanks may be cut from a strip.

♦ ♦ ♦

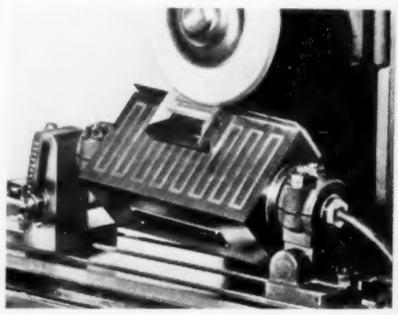
Semiautomatic Plating Unit—

Udylite Co., Detroit, is announcing a new semiautomatic plating machine, shown herewith. Features include a strong steel chassis, a new simplified chain-hook combination, alloy steel chain with breaking strength exceeding 5 tons, high current carrying capacity, etc. The company states that better plating results and a marked reduction of rejects are effected because each piece being plated is subjected to identical plating conditions. Therefore, the machine can be set and work plated to the desired thickness specification is produced. Production can be regulated within close limits. The work racks are hung on the chain conveyor and are carried away from and brought to the operator at a definite rate of speed. This results in a continuous uninterrupted flow of production which in turn means a saving in labor. Any desired chain speed between 1 and 4 feet per minute is obtainable.

♦ ♦ ♦

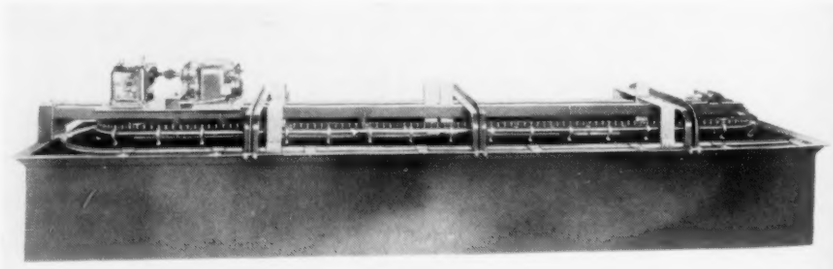
Magnetic Chuck—

Taft-Peirce Mfg. Co., Woonsocket, R. I., is introducing a tilting and swiveling magnetic chuck designed

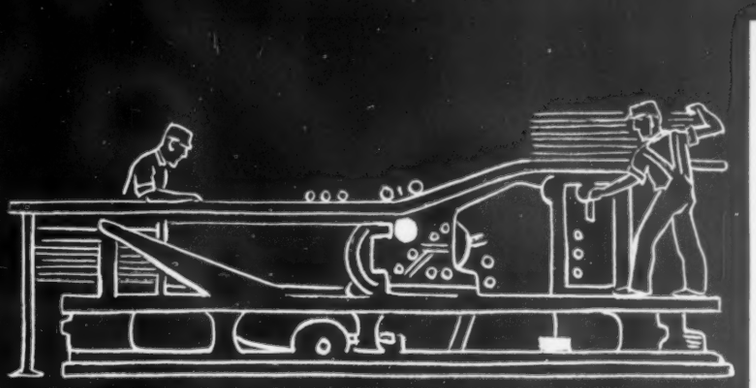


Taft-Peirce magnetic chuck for grinding compound angles

for precision grinding of compound angles. The powerful magnetic unit of this chuck, shown herewith, swivels to 90 degrees on either side of horizontal. It also can be tilted



Side view of 18-foot Udylite semiautomatic plating machine just introduced



Final Forms

close Mon. Dec. 23

There is still time to secure adequate advertising representation in this important issue.

Reservations should be made now and copy started at once.

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STEEL

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The

"YEARBOOK OF INDUSTRY"

ISSUE

for 1936 —

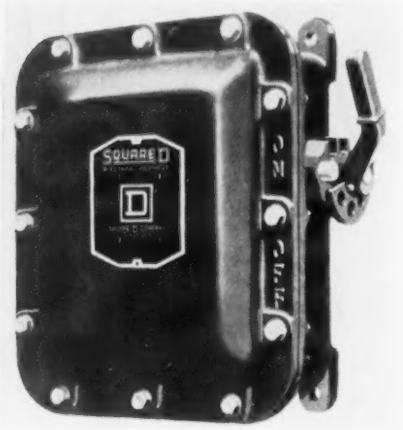
on January 6

along its axis to any angle from 0 to 14 degrees. Accurately graduated scales permit making exact angular settings and means are provided for clamping the chuck rigidly in place at whatever setting has been made.

♦ ♦ ♦

Explosion-Proof Switches—

Square D Co., Switch and Panel Division, Detroit, is bringing out a line of single-throw and double-throw, explosion-proof switches. Two pipe threaded conduit holes are supplied at the bottom of the enclosure, with pads on the sides and at the top for drilling other holes. These units, one of which is shown herewith, are the heavy-duty industrial type. They are obtainable in 2 and 3 poles from 30 to 200 amperes, 575 volts alternating current and 600 volts direct current.



Square D explosion-proof switch is heavy-duty industrial type

♦ ♦ ♦

Six-Curve Lens—

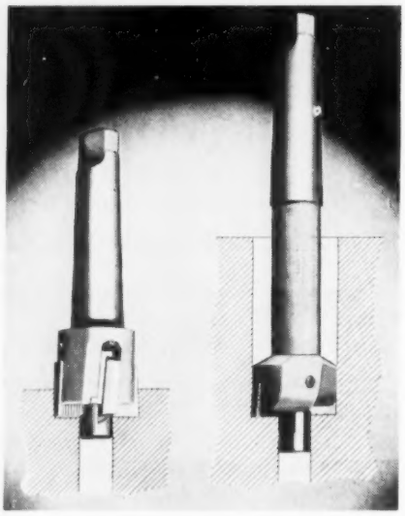
American Optical Co., Southbridge, Mass., is bringing out a new goggle lens known as the six-curve Super Armorplate. In a recent test a 1-inch steel ball was dropped from a height of 10 feet. The stop-motion photograph, reproduced herewith, is said to be the first ever taken of an impact goggle lens at the moment of impact and required an exposure of only 1/100,000 of a second. The standard test for goggle lenses specifies a ⅝-inch steel ball dropped from a height of 39 inches. In addition to its advantages in resisting impact hazards, the 6-curve lens is claimed to be more effective in deflecting glancing blows because of its higher curvature. Moreover, it permits a closer fitting to the face.

Stop-motion photo shows how American Optical Co.'s 6-curve lens withstood impact of 1-inch steel ball dropped from height of 10 feet

♦ ♦ ♦

Zee Lock Counterbores—

Ingersoll Milling Machine Co., Rockford, Ill., announces that application of its new zee lock cutter blade has been extended to inserted-blade counterbores. Two designs, shown herewith, are offered; one of the shallow type used for shallow boring or spotfacing operations, and other for deep boring operations. Furthermore, the serrations are broached into the cutter housing so that by moving the cutter blade to the next slot in sequence, the blade is only moved out part of a serration. Thus the diameter is maintained with a minimum of grinding.

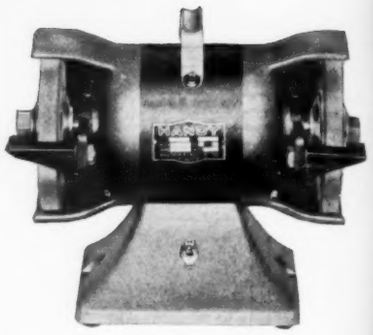


Ingersoll zee lock counterbores

♦ ♦ ♦

Industrial Brake Lining—

Thermoid Rubber Co., Trenton, N. J., is introducing a new type of brake lining for use on heavy industrial machinery and equipment. It has as its base asbestos tape that is woven in a single thickness. This tape is woven of heavy yarn containing brass wire and is impregnated with a highly heat resistant bakelite resin. It is ground on the wearing surface, ready for application, and will withstand heats above 900 degrees Fahr. without deteriorating, the manufacturer claims. It is recommended for services that involve fast deceleration such as encountered on cranes, hoists and tractors.



Baldor bench grinder is powered with capacitor type motor

♦ ♦ ♦

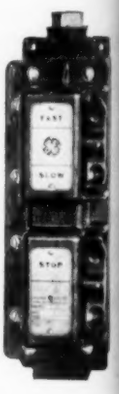
Bench Grinder—

Baldor Electric Co., 4357 Duncan avenue, St. Louis, is bringing out a new 6-inch ball bearing bench grinder, shown above. Features include adjustable tool rests, an attractive finish, and a capacitor type motor. Grinding wheels, one of which is fine and the other coarse, extend beyond the motor frame, permitting the grinding of long pieces of material. The unit also is portable, a handle being furnished for convenience.

♦ ♦ ♦

Pushbutton Master Switches—

General Electric Co., Schenectady, N. Y., is introducing a new line of water-tight pushbutton master switches mounted in molded phenolic compound enclosures. Each unit, shown herewith, is operated by a molded compound lever, thus protecting the operator from electrical contact with any metallic parts that might be "alive," and as many as four units may be mounted in one enclosure. The units, designated CR2940, provide both normally open and closed circuits. Either momentary-contact units or a combina-



This unit is typical of the new line of General Electric pushbutton master switches

FROM AN IRON CASTING TO Union Cold Drawn Steel AT A SAVING OF 63%

COLD DRAWING PROVIDES MAXIMUM MACHINABILITY

VIGILANT LABORATORY CONTROL

• Reduced material cost, reduced machining cost, less expensive inventories and greater strength were the results of replacing iron castings with Union Cold Drawn Steel for the making of this shaft coupling.

When made from a casting, machining was required over all the surface of the outside diameter. By using cold drawn bars, the operations for producing a smooth, bright surface, accuracy to close tolerance and uniform cross section were eliminated.

Machining cost, exclusive of set screw requirements, dropped from 12¢ to 2½¢ — a saving of 9½¢ per part. Material cost dropped from 37¢ to 15½¢ each — a saving of 21½¢. Total savings, 31¢ on an original cost of 49¢.

Being machined right from the bars, parts are now made as needed without requiring a stock of unfinished pieces. Being stronger than iron, cold drawn steel improved the quality of the coupling.

These striking facts suggest many profitable uses for cold drawn steel in place of forgings, castings or hot rolled stock, particularly where these stocks require surface machining. Watch your material cost, your machining cost and your inventory cost with an eye to what Union Cold Drawn Carbon and Alloy Steels can do to reduce them.

UNION DRAWN STEEL CO. MASSILLON, OHIO

SUBSIDIARY OF
REPUBLIC STEEL CORPORATION

Study these features of

UNION COLD DRAWN FLATS AND SQUARES

● These features of Union Cold Drawn Rectangles, important to hundreds of applications, are distinct qualities which no finishing process can produce so economically as cold drawing. These bars are stronger than steel in other forms and can be machined at lower cost. They are cold drawn within standard manufacturing tolerances.

Important economies are found by using these bars ground on one or more sides ready for nickel or chrome plating. They eliminate costly grinding operations at your plant.

Don't overlook uses for flats of extra width up to 12 inches. You can apply them in multiples to form flat surfaces of any area and do away with machining operations on castings to obtain that feature.

Because of their extensive size range, no cold drawn bar shapes find more varied uses than squares and flats. Large stocks are carried at distributors' warehouses. For your frequent needs, be sure you get Union Cold Drawn Bars with all their advantages.

UNION DRAWN STEEL CO. **MASSILLON, OHIO**

SUBSIDIARY OF
REPUBLIC STEEL CORPORATION

Among their Many Uses

Machine racks
Machine keys
Machine structural parts
Screw driver stock
Printers' chases
Chain side links
Elevator door closers
Jigs and dies
Fixtures
Bolts and nuts
Door handle stems
Crankshaft counterweights
Vault door grilles
Safety deposit boxes

FOR PARTS OF

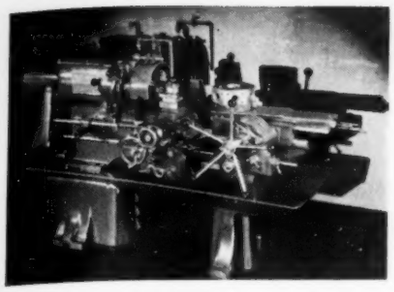
Automobiles
Business machines
Voting machines
Package machines
Printing presses
Textile machines
Cigarette making machinery

EXTRA WIDE FLATS

Bed plates
Die backing
Stripper plates
Pattern plates
Pin plates

Union Cold Drawn Steels

COLD · DRAWING · PROVIDES · MAXIMUM · MACHINABILITY



Gisholt turret lathe has labor saving devices as standard equipment

tion of momentary-contact and latched-in units are available.

• • •

Turret Lathes—

Gisholt Machine Co., Madison, Wis., announces its new ram type turret lathes for both high production work and small lot jobbing. The hexagon turret and its stop roll are indexed automatically to the next position with the back movement of the ram slide. As the ram slide goes forward to the work, the turret is located and clamped in place automatically. The operator need not take his hands from the pilot wheel to accomplish the entire operation. A quick indexing square turret on

Kron junior bench scale

the cross slide is arranged for holding four tools. A selective gear transmission permits a change in spindle speed without passing through intermediate speeds. Three levers control the 12 speeds available. The new design is shown at top of page.

• • •

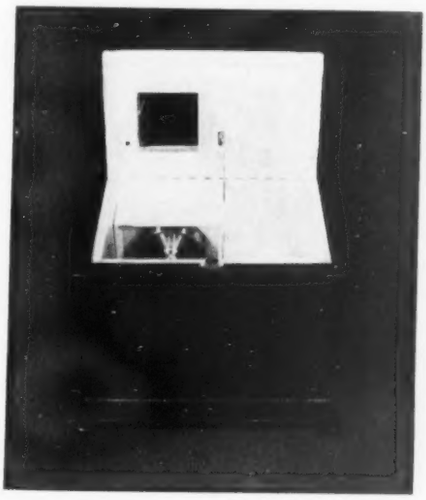
Bench Scale—

Kron Co., Bridgeport, Conn., is announcing a new small bench scale with a platform of 16½ by 18½ and a capacity ranging from 50 to 125 pounds. Dial mechanism of the unit, shown herewith, while smaller is similar to the standard double pendulum ball bearing type. Platform is full floating type and all levers operate about fixed fulcrums.

• • •

Machine for Testing Adhesion Of Lubricants—

Sperry Products Inc., Manhattan Bridge Plaza, Brooklyn, N. Y., has developed a machine for testing the adhesion of lubricants. Shown herewith, the unit, called an Adher-O-



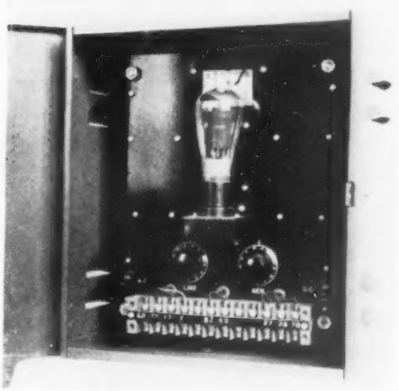
Sperry-Cammen Adher-O-Scope tests adhesion of lubricants

Scope, has numerous uses such as the determination of the effect of crude source on adhesion; the effect of added compounds; the difference between residiums and distillates; effect of artificial (accelerated) aging and actual use; and the effect of different degrees of refinement.

• • •

Angle Switching Equipment—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is marketing angle switching equipment for controlling large synchronous motor-driven reciprocating pumps and compressors to prevent the compression strokes on different units occurring in unison. Employing an electronic tube, this new device effectively reduces the magnitude of current pulsations where two or more drives are used. Minimum pulsations are desirable to reduce flicker in lights and interference with the operation of other electrical equipment.



Westinghouse control device for compressor motors

New Trade Publications

Blue Print Machine—Paragon-Revolute Corp., Rochester, N. Y. —A bulletin on its line of blueprinting equipment for rapid work.

Graphic Instruments—Esterline-Angus Co., Indianapolis. A bulletin, No. 333, enumerates features of instruments, with description and photograph.

Illuminator—Bausch & Lomb Optical Co., Rochester, N. Y. A leaflet, No. D-192.12.IX-35, containing description of the new surface illuminator for microscopes, including specifications and prices.

Boilers—Hays Corp., Michigan City, Ind. A folder with data on combustion recorders, draft gages, orsats, and combustion test sets; complete description in catalog TSH 35.

Minerals—E. J. Lavino & Co., Philadelphia. A 23-page booklet with a brief history of the company and a listing of its products, services and facilities.

Arc Welding—Lincoln Electric Co., Cleveland. A booklet on automatic arc welding by the electric tornado, describing the process and outlining its applications in shop and field.

Pumps—Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin W-475-B8 on three types of double helical rotary pumps; No. W-450-B24 on its deep well turbine pumps, both fully illustrated.

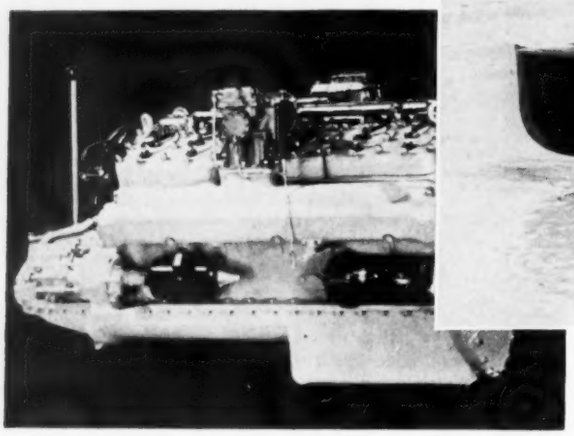
Electrical Equipment — General Electric Co., Schenectady, N. Y. Recent bulletins include, GEA-2177 on power selsyns; GEA-2103 on weatherproof line wire; GEA-246D, high-speed synchronous motors; GEA-1427-D, time switches.

Cast Iron—Fulton Foundry & Machine Co., Morgan avenue and East Seventy-fifth street, Cleveland. A bulletin describing Meehanite, basically a high test cast iron, but a new material, because the metallurgical process produces a new combination of physical properties.

Government Contracts—Fidelity & Deposit Co. of Maryland, Baltimore. A booklet of 58 pages devoted to procedure under government contracts for construction work or furnishing supplies; covers government's method of doing business and recourse open to contractors and suppliers if demands seem unreasonable; copies are free.

THE CRANKSHAFT
is Chromium-Vanadium Steel

Scripps V-12 power plant, built by Scripps Motor Co., Detroit, Mich.



This Scripps-powered Chris Craft provides the ultimate in power-boating thrills.

A most efficient power plant is the Scripps V-12 . . . with its 300 h.p. at 2400 r.p.m. . . . 240 h.p. at 1800 r.p.m. . . . a piston displacement of only 894 cubic inches and an overall length of only 58½ inches.

Contributing to the lightweight and dependability of the Scripps V-12 are many alloy steel parts. The crankshaft, naturally, is Chromium-Vanadium Steel—the steel that has proved its worth in thousands and thousands of automotive, marine and Diesel engines.

Picking the right steel for a given application calls for wide practical experience as well as metallurgical knowledge. All that the metallurgists of the Vanadium Corporation have learned in twenty-eight years of service to industry . . . the complete facilities of a research and development laboratory are freely offered to every user of steel. Give us an outline of your steel problem.

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VANADIUM CORPORATION OF AMERICA
120 BROADWAY, NEW YORK, N.Y.

Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories, Bridgeville, Pa.

Vanadium Steels

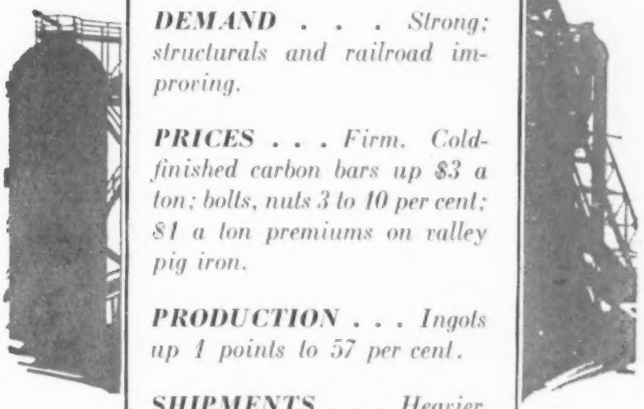
FOR STRENGTH · TOUGHNESS · DURABILITY

METALS VANCORAM ALLOYS

FERRO ALLOYS
of vanadium, silicon, chromium, titanium and silico-manganese, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

Steel Demand Broadens; Rate 57, New High;

Railroads, Structurals More Active; Scrap Up Again; Premiums for Valley Pig Iron



MARKET IN TABLOID

DEMAND . . . *Strong; structurals and railroad improving.*

PRICES . . . *Firm. Cold-finished carbon bars up $3 a ton; bolts, nuts 3 to 10 per cent; $1 a ton premiums on valley pig iron.*

PRODUCTION . . . *Ingots up 1 points to 57 per cent.*

SHIPMENTS . . . *Heavier.*

RISING demand for steel, in which the lighter finishes still predominate, heavier requirements for structural and railroad material in prospect, a strong market for pig iron and scrap, and a generally firm price situation are imparting to the industry a buoyancy unusual for December.

In sheets, strip, bars, and tin plate, mills now have a large volume of releases for shipment over the remainder of December, through January, and in some instances extending into February, insuring a high operating average for them during mid-winter months. With sheet and tin plate mills at 75 to 80 per cent, some steelmakers are deferring for the present plans for customary year-end repairs. Automobile output for the week rose 10,000 units to 93,000, the pre-Thanksgiving week level.

In structural shapes, reinforcing material, and pipe, the volume of inquiries from PWA projects now makes it appear impossible for fabricators to meet the government's deadline with bids by Dec. 15. While the majority of general contract awards are expected this month, a considerable portion of the program will extend into the early months of 1936.

Railroad repair shop activity is increasing, and steel shipments to them have improved. New York Central is taking bids on 30,000 to 40,000 tons of rails, and has doubled its immediate car repair schedule, obtaining bids on steel for 3000 units. Illinois Central has received a government loan for $3,000,000 for rehabilitating cars, and Chicago, Burlington & Quincy is buying additional steel for repairing 1250 cars. Delaware, Lackawanna & Western has awarded 10,000 tons of rails. Southern Pacific is in the market for 40,769 tons.

Large inquiries for steel for construction work multiplied during the week, some for private interests. Socony Vacuum Oil Co., New York, is negotiating for two tank ships requiring 10,000 tons of steel, and more demand was noted for oil tanks in eastern states. Los Angeles is taking bids on 27,000 to 35,000 tons of plates for a water main, St. Louis for 8300 tons, Cincinnati for 5700 tons of cast pipe. Shape awards in the week increased to 23,335 tons.

Daily average steel ingot production in November, 121,279 gross tons, was the largest for any November since 1929. The gain over October was 5 per cent. The month's output, 3,153,247 tons, was 1.1 per cent higher than October's. For 11 months, 30,313,507 tons, is an increase of 27.2 per cent over the first 11 in 1934.

Daily average pig iron production in November, 68,876 gross tons, was 7.9 per cent above October, and highest since October, 1930. Total output for the month, 2,066,294 tons, was 4.4 per cent higher than in October. For 11 months, output of 18,924,987 tons is 26.6 per cent over the first 11 in 1934. A net gain of six active stacks was made in November, to 122.

Currently, pig iron shipments are moderately heavier than in November. Some valley producers are obtaining premiums of $1 a ton over the recent increase of $1, for immediate delivery. Scrap is active and prices are strong, STEEL's composite advancing 4 cents to $13.16.

While base prices of cold finished carbon steel bars have been raised $3 a ton, an accompanying reduction of $3 a ton in chemical extras results in no change in net prices on most tonnage. Width and gage extras have been adopted for the first time on skelp, in line with similar extras on plates, bars, sheets, and strip. Prices of large bolts have been raised about 10 per cent, and small bolts 3 per cent.

Steelworks operations last week increased 1 point to 57 per cent, a new high for the year. Chicago advanced ½ point to 63 per cent; eastern Pennsylvania ½ to 39½; New England 3 to 93; Buffalo 7 to 47; Youngstown 2 to 60. Pittsburgh declined 2 points to 43. Other districts were unchanged.

STEEL's iron and steel price composite is up 2 cents to $33.30, while the finished steel index holds at $53.70.

COMPOSITE MARKET AVERAGES

	Dec. 7	Nov. 30	Nov. 23	One Month Ago Nov., 1935	Three Months Ago Sept., 1935	One Year Ago Dec., 1934	Five Years Ago Dec., 1930
Iron and Steel	$30.30	$33.28	$33.17	$33.15	$32.82	$32.39	$31.69
Finished Steel	53.70	53.70	53.70	53.70	53.70	54.00	49.30
Steelworks Scrap	13.16	13.12	13.12	12.92	12.65	11.02	10.77

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire sheets, plates, shapes, bars, black pipe, rails, alloy steel hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Dec. 7, 1935	Nov. 1935	Sept. 1935	Dec. 1934
Finished Material				
Steel bars, Pittsburgh	1.85c	1.85	1.85	1.80
Steel bars, Chicago	1.90	1.90	1.85	1.85
Steel bars, Philadelphia	2.16	2.16	2.11	2.09
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.75
Shapes, Pittsburgh	1.80	1.80	1.80	1.80
Shapes, Philadelphia	2.01½	2.01½	2.01½	2.00½
Shapes, Chicago	1.85	1.85	1.85	1.85
Tank plates, Pittsburgh	1.80	1.80	1.80	1.80
Tank plates, Philadelphia	2.00	1.99	1.99	1.98½
Tank plates, Chicago	1.85	1.85	1.85	1.85
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.85
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.40
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	3.10
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.95
Sheets, No. 24, hot anneal., Gary	2.55	2.50	2.50	2.50
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	3.20
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.40	2.40	2.40	2.60
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$30.00	29.50	28.00	28.00
Sheet bars, open-hearth, Pitts.	30.00	29.50	28.00	28.00
Billets, open-hearth, Pittsburgh	29.00	28.50	27.00	27.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00

	Dec. 7, 1935	Nov. 1935	Sept. 1935	Dec. 1934
Pig Iron				
Bessemer, del. Pitts.	$20.8132	$20.8132	$19.8132	$19.76
Basic, Valley	19.00	19.00	18.00	18.00
Basic, eastern, del. eastern Pa.	20.8132	20.8132	19.8132	19.76
No. 2 fdry., del. Pitts.	20.3132	20.3132	19.3132	19.26
No. 2 fdry., Chicago	19.50	19.50	18.50	18.50
Southern No. 2, Birm.	15.50	14.75	14.50	14.50
Southern No. 2 del. Cincinnati	20.2007	20.2007	19.2007	19.13
No. 2X eastern, del. Phila.	21.6882	21.6882	20.6882	20.63
Malleable, Valley	19.50	19.50	18.50	18.50
Malleable, Chicago	19.50	19.50	18.50	18.50
Lake Sup. charcoal, del. Ch.	25.2528	25.2528	24.2528	24.04
Ferromanganese, del. Pitts.	90.13	90.13	90.13	89.79
Gray forge, del. Pitts.	19.6741	19.6741	18.6741	18.63
Scrap				
Heavy melting steel, Pittsburgh	$13.75	13.65	13.45	12.95
Heavy melt. steel, No. 2, east. Pa.	11.25	11.00	11.25	9.30
Heavy melting steel, Chicago	13.50	13.20	12.55	10.55
Rails for rolling, Chicago	14.75	14.30	13.90	11.65
Railroad steel specialties, Chicago	14.25	13.75	13.75	11.90
Coke				
Connellsville, furnace, ovens	$3.65	3.55	3.25	3.60
Connellsville, foundry, ovens	4.25	4.35	4.00	4.60
Chicago, by-product foundry, del.	9.75	9.75	9.25	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week

Sheet Steel

Hot Rolled No. 10, 24-48 in.

Pittsburgh	1.85c
Gary	1.95c
Chicago, delivered	1.98c
New York, del.	2.20c
Philadelphia, del.	2.16c
Birmingham	2.00c
St. Louis, del.	2.18c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, delivered	2.60c
New York, del.	2.75c
Philadelphia, del.	2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered	3.23c
Philadelphia, del.	3.41c
New York, del.	3.45c
Birmingham	3.25c
St. Louis, del.	3.43c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.08c

Cold Rolled No. 10

Pittsburgh	2.50c
Gary	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.81c
New York, del.	2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

Pittsburgh	2.95c
Gary	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.26c
New York, del.	3.30c

Enameling Sheets

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered	2.22c
Buffalo, delivered	2.05c
Chicago or Gary	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.08c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½c
Boston, delivered	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel

(Base, 5 to 25 tons)

Pittsburgh	1.85c
Chicago or Gary	1.90c
Duluth	2.00c
Birmingham	2.00c
Cleveland	1.90c
Buffalo	1.95c
Detroit, delivered	2.00c
Pacific ports, f.o.b. cars, dock	2.40c
Philadelphia, del.	2.16c
Boston, delivered	2.27c
New York, del.	2.20c
Pitts., forg. qual.	2.10c

Rail Steel

To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	2.06c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.36c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight carloads; less than straight carloads take trade quantity extras; 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base Pitts.-Cleve. 100 lb. keg.	
Standard wire nails	$2.40
Cement coated nails	2.40
Galvanized nails, 15 gage and coarser	4.40
do. finer than 15 gage	4.90

(Per pound)

Polished staples	3.10c
Galvanized fence staples	3.35c
Barbed wire, galv.	2.80c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$58.00

To Manufacturing Trade

Plain wire, 6-9 gage	2.30c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

*10,000 to 19,999 lbs.	2.10c
*20,000 to 59,999 lbs.	2.05c
*60,000 to 99,999 lbs.	2.00c
*100,000 lbs. and over	1.97½c

Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.45c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni.	1.05
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon Van.	0.95
9250 carbon base plus extras	

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23⅞-in.	
Pittsburgh	1.85c
Chicago or Gary	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Philadelphia, del.	2.16c
New York, del.	2.20c
Cooperage hoop,	
Pittsburgh	1.95c
Chicago	2.05c
Cold-strip strip,	
Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
20-45 lbs.	$28.00
45-50 lbs.	$25.00
50-60 lbs.	$26.00
70-75 lbs.	$24.50
80-90 lbs.	$26.00
100 lbs.	$27.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll, qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.10c
Track bolts, base	3.60c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $2; 16 and 20 lbs., up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage and Machine

*½ x 6 and smaller	70-10-5 off
*Do. larger	70-10 off
*Tire bolts	55 off

Plow Bolts

*All sizes	70-10 off

Stove Bolts

*In packages with nuts attached 72½-10 off; in packages with nuts separate 72½-10-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

*Step bolts	65-5 off
*Elevator bolts	65-5 off

Nuts

S. A. E. semifinished hex.:

*½ to ⅞-inch	60-20-15 off
*Do., 1 to 1-inch	60-20-15 off
*Do., over 1-inch	60-20-15 off

Hexagon Cap Screws

Milled	80-10-10 off
Upset, 1-in., smaller	85 off

Square Head Set Screws

Upset, 1-in., smaller	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila., to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, expect on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.

Butt Weld

In.	Blk.	Galv.
Steel		
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

Steel		
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel	
½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots or 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are uoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$29.00
Philadelphia	34.67
Duluth	31.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chi., Buff.	35.00
Forging, Duluth	37.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	30.00

Slabs

Pitts., Chi., Cleve., Young.	29.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	40.00
Chicago	41.00
Worcester, Mass.	42.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.80c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.65- 3.75
Connellsville, fdry.	5.25- 4.40
Connel., prem. fdry.	5.50- 5.75
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.20- 9.65
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del.	11.50
St. Louis, del.	10.00
Birmingham, ovens	6.00
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	9.75
Buffalo, ovens	7.50- 8.00
Detroit, ov., out. del.	9.06
Philadelphia, del.	9.03

Coke By-Products

Per gallon, producers' plants.

Tank lots	Spot
Pure and 90% benzol	18.00c
Toluol	30.00c
Solvent naphtha	30.00c
Commercial xylol	30.00c

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	6.75c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$20.50	$21.00	$20.00	$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.,	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00
Delivered from Basing Points:				
Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	†19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20 20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.07	21.07
Muskegon, Mich., from Chicago Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25

Delivered from Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
St. Louis, northern	20.00	20.00	19.50	.....
St. Louis from Birmingham	†19.62	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

Low Phos

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $24.00, Phila. base, standard and copper bearing, $25.13.

Gray Forge		Charcoal	
Valley furnace	19.00	Lake Superior fur.	$22.00
Pitts. dist. fur.	19.00	Do., del. Chicago	25.25
		Lyles, Tenn.	22.50

Silvery†

Jackson county, O., base: 6-6.50 per cent $22.75; 6.51-7—$23.25; 7-7.50—$23.75; 7.51-8—$24.25; 8-8.50—$24.75; 8.51-9—$25.25; 9-9.50—$25.75. Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon: 2 to 3%, $1 per ton additional. Each unit over 3%, $1 per ton additional.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$55.00

First Quality

Pa., Ill., Md., Mo.	$45.00
Alabama, Ga., Ky.	$40.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.00
Ga., Ala.	35.00

Ohio

First quality	$40.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	45.00
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$20.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$16.00-17.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsb'gh	90.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent. Spot, $5 a ton higher.	126-130.00
Silicoman., 2½ carb.	90.00
2% carbon, 95.00; 1%,	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont.	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
Nov. 30	9.25	9.37½	8.85	51.25	48.37½	4.50	4.35	4.85	*19.00	14.75	35.00
Dec. 2	9.25	9.37½	8.85	51.50	48.50	4.50	4.35	4.85	*19.00	14.75	35.00
Dec. 3	9.25	9.37½	8.85	52.00	48.75	4.50	4.35	4.85	*19.00	14.75	35.00
Dec. 4	9.25	9.37½	8.85	51.50	48.62½	4.50	4.35	4.85	*19.00	14.75	35.00
Dec. 5	9.25	9.37½	8.85	51.12½	48.12½	4.50	4.35	4.85	*19.00	14.75	35.00
Dec. 6	9.25	9.37½	8.85	51.12½	48.10	4.50	4.35	4.85	*19.00	14.75	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.62½
Copper hot rolled	16.25
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
Tubes	
High yellow brass	16.62½
Seamless copper	16.75
Rods	
High yelow brass	13.12½
Copper, hot rolled	13.50
Anodes	
Copper untrimmed	14.00
Wire	
Yellow brass (high)	15.12½

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	5.50- 5.75
Cleveland	6.00- 6.25
*Chicago	6.00- 6.12½
St. Louis	6.00- 6.25
Heavy Copper and Wire	
New York, No. 1	7.00- 7.25
*Chicago, No. 1	7.00- 7.25
Cleveland	6.75- 7.00
St. Louis, No. 1	7.00- 7.37½
Composition Brass Borings	
New York	5.00- 5.25
Light Copper	
New York	5.75- 6.00
*Chicago	5.50- 5.75
Cleveland	5.75- 6.00
St. Louis	5.75- 6.00
Light Brass	
*Chicago	3.37½-3.62½
Cleveland	3.25- 3.50
St. Louis	3.50- 3.75
Lead	
New York	3.50- 3.75
Cleveland	3.50- 3.75
Chicago	3.37½-3.62½
St. Louis	3.65- 3.75
Zinc	
New York	2.00- 2.25
Cleveland	2.50- 2.75
St. Louis	2.75- 3.00
Aluminum	
Borings, Cleveland	8.50- 9.00
Mixed, cast, Cleve.	13.25-13.50
Mixed, cast. St. L.	13.00-13.50
Clips, soft, Cleve.	14.75-15.00
SECONDARY METALS	
*Brass ingot, 85-5-5-5	9.50
Stand. No. 12 alum.	17.00-17.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.50- 9.50
Boston, dock, expt.	9.50- 9.75
Boston, domestic	7.50- 7.75
Buffalo, No. 1	11.50-12.00
Buffalo, No. 2	10.00-10.50
Chicago, No. 1	13.25-13.75
Cleveland, No. 1	13.00-13.50
Cleveland, No. 2	12.00-12.50
Detroit, No. 1	9.25- 9.75
Detroit, No. 2	7.75- 8.25
Eastern Pa., No. 1	12.00-12.50
Eastern Pa., No. 2	11.00-11.50
Federal, Ill.	9.75-10.00
Granite City, R. R.	10.50-11.00
Granite City, No. 2	9.25- 9.75
N. Y., deal, No. 2	7.50- 7.75
N. Y., deal. barge	8.50- 8.75
Pitts., No. 1 (R. R.)	14.50-15.00
Pitts., No. 1 (dlr.)	13.50-14.00
Pittsburgh, No. 2	12.00-12.50
St. Louis	9.00- 9.50
Valleys, No. 1	13.50-14.00

COMPRESSED SHEETS

Buffalo, dealers	10.00-10.50
Chicago, factory	12.50-13.00
Chicago, dealer	11.50-12.00
Cleveland	12.25-12.75
Detroit	9.75-10.25
E. Pa., new mat.	11.50-12.00
Pittsburgh	13.75-14.25
St. Louis	7.00- 7.50
Valleys	13.00-13.25

BUNDLED SHEETS

Buffalo	8.00- 8.50
Cincinnati, del.	8.00- 8.50
Cleveland	9.75-10.25
Pittsburgh	12.50-13.00
St. Louis	5.50- 6.05

SHEET CLIPPINGS, LOOSE

Chicago	8.00- 8.50
Cincinnati	7.50- 8.00
Detroit	7.25- 7.75
St. Louis	5.00- 5.50

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	14.50-15.00
Chicago (3 ft.)	15.00-15.50
Chicago (2 ft.)	16.00-16.50
Cincinnati, del.	14.00-14.50
Detroit	12.50-13.00
Pitts., open-hearth, 3 ft. and less	15.00-15.50
St. Louis, 2 ft. & less	14.00-14.50

STEEL RAILS, SCRAP

Boston	7.50- 7.75
Chicago	13.25-13.75
Pittsburgh	14.00-14.50
St. Louis	11.50-12.00
Buffalo	11.50-12.00

STOVE PLATE

Birmingham	7.00- 7.50
Boston, dealers	4.75- 5.00
Buffalo	10.25-10.75
Chicago	7.00- 7.50
Cincinnati, dealers	7.50- 8.00
Detroit, net	7.00- 7.50
Eastern Pa.	9.50-10.00
N. Y., deal. fdry.	6.00
St. Louis	7.00- 7.50

COUPLERS, SPRINGS

Buffalo	14.50-15.00
Chicago, springs	14.00-14.50
Eastern Pa.	14.50-15.00
Pittsburgh	15.75-16.25
St. Louis	12.00-12.50

ANGLE BARS—STEEL

Chicago	14.00-14.50
St. Louis	12.25-12.75

RAILROAD SPECIALTIES

Chicago	14.00-14.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	14.50-15.00
Cleveland, billet, bloom crops	16.00-16.50
Eastern Pa., crops	15.50-16.00
Pittsburgh, billet, bloom crops	16.50-17.00
Pittsburgh, sheet bar crops	15.50-16.00

FROGS, SWITCHES

Chicago	13.25-13.75
St. Louis, cut	11.50-12.00

SHOVELING STEEL

Chicago	13.25-13.75
Federal, Ill.	9.75-10.25
Granite City, Ill.	8.75- 9.25

RAILROAD WROUGHT

Birmingham	7.00- 7.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	10.00-10.50
Buffalo, No. 2	11.50-12.00
Chicago, No. 1, net	10.00-10.50
Chicago, No. 2	13.25-13.75
Cincinnati, No. 2	10.50-11.00
Eastern Pa.	12.00-12.50
N. Y., No. 1, deal.	9.50-10.00
St. Louis, No. 1	7.75- 8.25
St. Louis, No. 2	10.50-11.00

SPECIFICATION PIPE

Eastern Pa.	10.50
New York, dealers	3.50- 4.00

BUSHELING

Buffalo, No. 1	10.00-10.50
Chicago, No. 1	11.50-12.00
Cinci., No. 1, deal.	7.50- 8.00
Cincinnati, No. 2	4.50- 5.00
Cleveland, No. 2	7.50- 8.00
Detroit, No. 1, new	8.50- 9.00
Valleys, new, No. 1	12.75-13.00

MACHINE TURNINGS

Birmingham	4.00- 4.50
Boston, dealers	3.25- 3.50
Buffalo	5.75- 6.25
Chicago	6.50- 7.00
Cincinnati, dealers	6.00- 6.50
Cleveland	7.00- 7.50
Detroit	5.25- 5.75
Eastern Pa.	7.50- 8.00
New York, dealers	3.50- 3.75
Pittsburgh	9.50-10.00
St. Louis	3.25- 3.75
Valleys	9.00- 9.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	2.50- 2.75
Buffalo	7.75- 8.25
Cincinnati, dealers	5.50- 6.00
Cleveland	7.50- 8.00
Detroit	5.25- 5.75
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.50
Pittsburgh	8.00- 9.00

CAST IRON BORINGS

Birmingham, plain	4.00- 4.50
Boston, chemical	5.50- 6.50
Boston, dealers	3.25- 3.50
Buffalo	7.75- 8.25
Chicago	6.00- 6.50
Cincinnati, dealers	5.50- 6.00
Cleveland	7.50- 8.00
Detroit	5.25- 5.75
E. Pa., chemical	10.00-12.00
New York, dealers	2.00- 2.50
St. Louis	3.75- 4.25

PIPE AND FLUES

Cincinnati, dealers	7.00- 7.50

RAILROAD GRATE BARS

Buffalo	8.50- 9.00
Chicago, net	7.50- 8.00
Cincinnati	6.00- 6.50
Eastern Pa.	9.00- 9.50
New York, dealers	5.00- 5.25
St. Louis	5.00- 5.50

FORGE FLASHINGS

Boston, dealers	6.25- 6.50
Buffalo	10.50-11.00
Cleveland	11.00-11.50
Detroit	8.50- 9.00
Pittsburgh	12.50-13.00

FORGE SCRAP

Boston, dealers	4.50- 5.00
Chicago, heavy	14.00-14.50
Eastern Pa.	12.25-12.75

ARCH BARS, TRANSOMS

St. Louis	12.25-12.75

AXLE TURNINGS

Boston, dealers	3.75- 4.25
Buffalo	10.50-11.00
Chicago, elec. fur.	12.00-12.50
Eastern Pa.	11.00
St. Louis	8.50- 9.00

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	10.50-11.00
Buffalo	14.50-15.00
Chicago, net	14.50-15.00
Eastern Pa.	17.00
St. Louis	12.75-13.25

SHAFTING

Boston, ship point.	13.00-13.25
Eastern Pa.	18.50
New York, dealers	13.50-14.00
St. Louis	12.00-12.50

CAR WHEELS

Birmingham	9.00- 9.50
Boston, iron deal.	7.00- 7.75
Buffalo, iron	11.00-11.50
Buffalo, steel	14.50-15.00
Chicago, iron	13.00-13.50
Chicago, rolled steel	14.00-14.50
Cincinnati, iron	10.50-11.00
Eastern Pa., iron	12.50-13.00
Eastern Pa., steel	14.50-15.00
Pittsburgh, iron	13.50-14.00
Pittsburgh, steel	15.50-16.00
St. Louis, iron	10.25-10.75
St. Louis, steel	12.00-12.50

NO. 1 CAST SCRAP

Birmingham	9.00- 9.50
Boston, No. 1 mach.	9.00- 9.25
Boston, No. 2	8.25- 8.50
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	11.75-12.25
Buffalo, mach.	13.00-13.50
Chicago, agri. net	10.00-10.50
Chicago, auto	11.00-11.50
Chicago, mach. net	12.00-12.50
Chicago, railr'd net	10.50-11.00
Cinci., mach. cup	10.50-11.00
Cleveland, cupola	12.75-13.25
Detroit, net	11.50-12.00
Eastern Pa., cupola	12.50-13.00
E. Pa., mixed yard	10.50
Pittsburgh, cupola	13.75-14.25
San Francisco, del.	13.50-14.00
Seattle	7.50- 9.00
St. Louis, No. 1	10.00-10.50
St. L., No. 1 mach.	11.50-12.00

HEAVY CAST

Boston, del.	6.75- 7.00
Buffalo, break.	10.50-11.00
Cleveland, break	10.50-11.00
Detroit, No. 1, mach. net	12.00-12.50
Detroit, break.	9.00- 9.50
Detroit, auto net	11.50-12.00
Eastern Pa.	11.50-12.00
N. Y., break. deal.	9.00- 9.50
Pittsburgh	12.50-13.00

MALLEABLE

Birmingham, R. R.	11.50-12.50
Boston, consum.	13.50-14.50
Buffalo	14.50-15.00
Chicago, R. R.	15.75-16.25
Cincinnati, agri. del.	11.50-12.00
Cleveland, rail	16.00-16.50
Detroit, auto net	13.00-13.50
Pittsburgh, rail	16.50-17.00
St. Louis, R. R.	13.75-14.25
Eastern Pa., R. R.	14.00-14.50

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.00
Boston, dealers	8.00- 8.50
Buffalo	12.00-12.50
Chicago	14.50-15.00
Eastern Pa.	13.00-14.00
New York, dealer	10.50-11.00
St. Louis	12.50-13.00

LOCOMOTIVE TIRES

Chicago (cut)	14.00-14.50
St. Louis, No. 1	11.75-12.25

LOW PHOS. PUNCHINGS

Buffalo	14.50-15.00
Chicago	15.00-15.50
Eastern Pa.	15.00-16.00
Pittsburgh (heavy)	15.50-16.00
Pittsburgh (light)	15.00-15.50

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.50
No. Afr. low phos.	10.50
Swedish basic, 65%	9.50
Swedish low phos.	10.50
Spanish No. Africa basic, 50 to 60%	10.50
Tungsten, spot sh. ton unit, duty pd.	$15.50-16.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	19.25

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	3.00c
Boston††	3.00c
Buffalo	3.00c
Chattanooga	3.36c
Chicago (j)	3.00c
Cincinnati	3.22c
Cleveland	3.00c
Detroit	3.09c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.06c
New Orleans	3.35c
New York‡(d)	3.31c
Pitts. (h)	2.95c-3.10c
Philadelphia*	3.03c
Portland	3.70c
San Francisco	3.50c
Seattle	3.70c
St. Louis	3.25c
St. Paul	3.25c-3.40c
Tulsa	3.25c

IRON BARS

Portland	3.40c
Chattanooga	3.36c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.22c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.20c
Tulsa	3.25c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.36c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.25c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.46c
Philadelphia*	2.98c
Pittsburgh(h)	3.15c
Portland (i)	3.70c
San Francisco	3.50c
Seattle (i)	3.70c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c

PLATES

Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.50c
Seattle	3.55c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c

NO. 10 BLUE

Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.70c
Milwaukee	3.16c
New Orleans	3.55c
New York	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Francisco	3.60c
Seattle	3.75c
St. Louis	3.45c
St. Paul	3.30c
Tulsa	3.70c

NO. 24 BLACK

Baltimore*†	3.60c
Boston (g)	2.95c
Buffalo	3.25c
Chattanooga	4.16c
Chicago	3.85c
Cincinnati	4.02c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New Orleans	4.50c
New York	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.25c
Seattle	4.40c
St. Louis	4.10c
St. Paul	3.90c
Tulsa	4.75c

NO. 24 GALV. SHEETS

Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.40c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.65c
St. Paul	4.50c
Tulsa	5.10c

BANDS

Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York (d)	3.56c
Philadelphia	3.18c
Pittsburgh (h)	3.20c
Portland	4.25c
San Francisco	4.10c
Seattle	4.25c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.45c

HOOPS

Baltimore	2.30c
Boston	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York	3.56c
Philadelphia	3.43c
Pittsburgh (h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.55c
St. Paul	3.55c

COLD FIN. STEEL

Baltimore (c)	3.58c
Boston	3.75c
Buffalo (h)	3.40c
Chattanooga*	3.98c
Chicago (h)	3.35c
Cincinnati	3.57c
Cleveland (h)	3.35c
Detroit	3.49c
Los Ang. (f) (d)	5.85c
Milwaukee	3.46c
New Orleans	4.15c
New York	3.81c
Philadelphia	3.61c
Pittsburgh	3.20c
Portland (f) (d)	6.00c
San Fran.(f) (d)	5.80c
Seattle (f) (d)	6.00c
St. Louis	3.60c
St. Paul	3.87c
Tulsa	4.50c

COLD ROLLED STRIP

Boston, 0.100-in., 500 lb. lots	3.245c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.22c
Cleveland (b)	3.20c
Detroit	3.33c
New York	3.36c
St. Louis	3.45c

TOOLS STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up)

	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	70
Cleveland	70
Detroit	70-10
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Minus quant. diff.; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 inches; (j) shapes other than rounds, flats, fillet angles, 3.15c.

‡Domestic bars; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 9999 lbs., base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 5

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$15.38 3 2 6	$14.56	1 16 0
Basic bessemer	15.38 3 2 6*	12.95	1 12 0
Hematite, Phos. .03-.05	16.02 3 5 0	.....	.....
SEMIFINISHED STEEL			
Billets	$27.11 5 10 0	$19.02	2 7 0
Wire rods, No .5 gage	41.90 8 10 0	36.44	4 10 0
FINISHED STEEL			
Standard rails	$40.67 8 5 0	$44.53	5 10 0
Merchant bars	1.65c 7 10 0	1.15c to 1.20c	5 2 6 to 5 5 0
Structural shapes	1.65c 7 10 0	1.14c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 1 3	1.56c	4 5 0
Sheets, black, 24 gage or 0.5 mm	2.09c 9 10 0	2.13c	5 16 0††
Sheets, gal., 24 gage, corr.	2.53c 11 10 0	2.19c	6 0 0
Bands and strips	1.87c 8 10 0	1.46c	4 0 0
Plain wire, base	2.02c 9 5 0	1.96c	5 7 6
Galvanized wire, base	2.36c 10 15 0	2.29c to 2.33c	6 5 6 to 6 7 6
Wire nails, base	2.64c 12 0 0	2.11c	5 15 0
Tin plate, box 108 lbs.	$ 4.62 0 18 9	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$17.26 3 10 0(a)	$17.13	260	$12.85	380	$25.36 63
Basic bessemer pig iron	17.26 3 10 0(a)	12.52	190	11.83	350	27.97 (b) 69.50
Furnace coke	4.56 18 6	6.26	95	3.89	115	7.65 19
Billets	27.12 5 10 0	28.34	430	18.25	540	38.85 96.50
Standard rails	1.81c 8 5 0	2.08c	694	1.65c	1,100	3.42c 132
Merchant bars	1.89c 8 12 0	1.68c	560	.90c	600	2.01c 110
Structural shapes	1.92c 8 15 0	1.65c	550	.90c	600	1.97c 107.50
Plates, †¾-in. or 5 mm.	1.99c 9 1 3	2.10c	700	1.05c	700	2.32c 127
Sheets, black	2.49c 11 5 0§	1.69c	575‡	1.24c	825‡	2.64c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.91c 13 5 0	3.00c	1,000	2.25c	1,500	6.77c 370
Plain wire	2.03c 9 5 0	2.64c	900	1.73c	1,150	3.17c 173
Bands and strips	2.06c 9 7 0	1.95c	650	1.26c	840	2.32c 127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.

**Gold pound sterling carries a premium of 66.25 per cent over paper sterling.

Bars

Bar Prices, Page 66

Pittsburgh — Specifications for merchant steel bars declined slightly the past week, now that the threat of a $3 a ton price increase for the first quarter has disappeared. Producers continue to quote 1.85c for 5 to 25-ton lots. Some first-quarter buying has already appeared in purchases from the automotive trade. Forge shops are 40 to 50 per cent busier than this time a year ago, and requirements of other bar producers are sustained at a steady rate.

Cleveland—Contracting for steel bars for first quarter has been light since books were opened Dec. 2 at unchanged prices. Currently, however, a moderate increase is noted in actual requirements, especially from automobile manufacturers and forge shops. Tonnage to be specified this month is not expected to equal that of November. For some sellers here bookings so far this year are double those in the comparable period in 1934. Labor difficulties at Detroit, Toledo and Canton affecting automobile parts suppliers have not yet seriously impeded steel shipments.

Chicago—Steel bar specifications have slackened moderately, due principally to the decline of interest in forward buying as a result of the extension of present prices into first quarter. Shipments still are relatively heavy, however, due partly to the continued active requirements of the automotive and farm implement industries.

Boston — Commercial steel bar buying has declined slightly. Removal of price uncertainty reduced anticipatory purchasing and most individual orders are in 25-ton lots or less.

New York—Bar buying is less active since prices have been reaffirmed for first quarter.

Youngstown, O.—Indicating that recent buying of steel bars was not speculative, consumers are urging upon mills here that shipments be expedited.

Plates

Plate Prices, Page 66

Pittsburgh—Owing to more stringent steamboat inspection rules effective Jan. 1, considerable repair work is proceeding on river barges in this district. Greene Line Steamers, Cincinnati, has placed a contract with Dravo Contracting Co. to build a steel hull for the packet steamer KIWANIS. Campbell Transportation Co., Pittsburgh, is circulating an inquiry for four 195-foot steel barges, which will require about 800 tons of plates. The tank market is active insofar as small projects are concerned. Through its Des Moines, Iowa, division, Pittsburgh-Des Moines Steel Co., Pittsburgh, has been awarded contracts for the construction of a welded plate pipe line from Cascade Springs to Wartrace, Tenn., at $121,649, and for a similar job to Bell Buckle, Tenn., at $47,596.

Cleveland—Plates are among the few products which fail to show an increase in tonnage booked this year compared with 1934, in the experience of some leading sellers here. The shortage is not large, but is in striking contrast to important gains in some other lines. Some of the smaller interests whose business comes mainly from tank, boiler and machinery fabricators report a slight increase for the year. Demand is restricted for the present to carload lots.

Chicago—While plate demand is improving, the movement still is relatively slow compared with bars, sheets and strip. Structural work is taking larger lots and requirements

GEAR STEEL MUST NOT FAIL . . . . .

For DEPENDABILITY Specify . . .

B/L Cold Drawn Steel

As modern engine speeds are stepped up to maximum rates, and heavier loads are imposed on gear mechanisms, only the use of *cold drawn steel* can insure the strength and stamina demanded for safety.

Gears cut from B & L Cold Drawn Steel eliminate the service hazards that come from hidden flaws in forgings or castings. There is less distortion from heat treatment after forming, and more freedom from internal stresses. If your problem is one of manufacturing economy, accuracy of finished part, or impact and wear resistance, then B & L engineers can help you determine the proper gear steel for your purpose.

Your inquiries will receive prompt and expert attention.

BETTER MADE STEELS LABORATORY TESTED

Cold Drawn Bars and Shafting ● Ultra-Cut Screw Stock ● Special Sections ● Alloy Steels

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

of railroad shops gradually are improving.

Boston—Plate demand for large tank needs is the best in several months. Miscellaneous small orders are off slightly.

New York—Plates are featured by brisk demand for tanks for oil companies and improved requirements from utility companies for general repairs. Pipe fabricators here are figuring on a muncipal water line for St. Louis involving 8300 tons of plates. Opening of bids on three ferryboats for New York has been postponed from Dec. 2 to Dec. 6. Opening on the International Merchant Marine-Roosevelt Steamship Co. liner has been deferred from Dec. 5 to Dec. 7.

Philadelphia — Plate producers generally report some decline in buying, though ship work is more promising. Two tankers requiring 8000 to 10,000 tons of plates, shapes and bars are active for Socony Vacuum Oil Co., New York. One trade leader believes possibly six or eight more tankers may be brought out in the next 30 to 60 days. New bids were opened last week on the International Mercantile Marine-Roosevelt Steamship Co. liner, which will require 15,000 tons of hull steel. One yard in this district is figuring on three naval vessels, bids to open Dec. 17. One is a motor ship, requiring 1065 tons, of which 700 tons is plates; another a ferry taking 500 tons of plates and 135 tons of shapes and bars; the third a tug taking 90 tons of plates and 50 tons of miscellaneous steel.

San Francisco—The metropolitan water district, Los Angeles, has just issued a call for bids, to be opened on Jan. 7, for one of the largest pipe line inquiries in the history of the Pacific Coast. Alternate bids are to be taken on welded steel pipe, ranging from 9 feet, 8 inches, to 12 feet and involving from 27,000 tons to 35,000 tons of plates, or on precast reinforced concrete pipe, which will require approximately the same tonnage of steel divided between reinforcing bars and liner plates.

Seattle — Interest in plates is slack and no important specifications are up for figures. Demand for light plates has declined but shipyard repair jobs have called for some heavier gages recently. Bids at Ogden, Utah, Dec. 20 for the Ogden river project, involve 464 feet of metal flume and a quantity of 12 to 36-inch corrugated metal pipe.

Contracts Placed

2000 tons, two pumping units, specification 133, metropolitan water district, Los Angeles, to Consolidated Steel Corp., Los Angeles.

911 tons, 8 to 26-inch welded steel pipe, Vista irrigation district, Vista, Calif., to Consolidated Steel Corp., Los Angeles.

700 tons, 10 to 16-inch welded steel pipe, St. George, Utah, to Consolidated Steel Corp., Los Angeles.

Unstated tonnage, fabricated plate pipe line from Cascade Springs to Wartrace, Tenn., at $121,649 and to Bell Buckle, Tenn., at $47,596, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Contracts Pending

27,000 to 35,000 tons, for pipe line for metropolitan water district, Los Angeles; bids asked for Jan. 7.

1800 tons, six tanks for water department, Long Beach, Calif.; bids opened.

1650 tons, 36-inch welded pipe, Berkeley, Calif.; Steel Tank & Pipe Co., Berkeley, Calif., low.

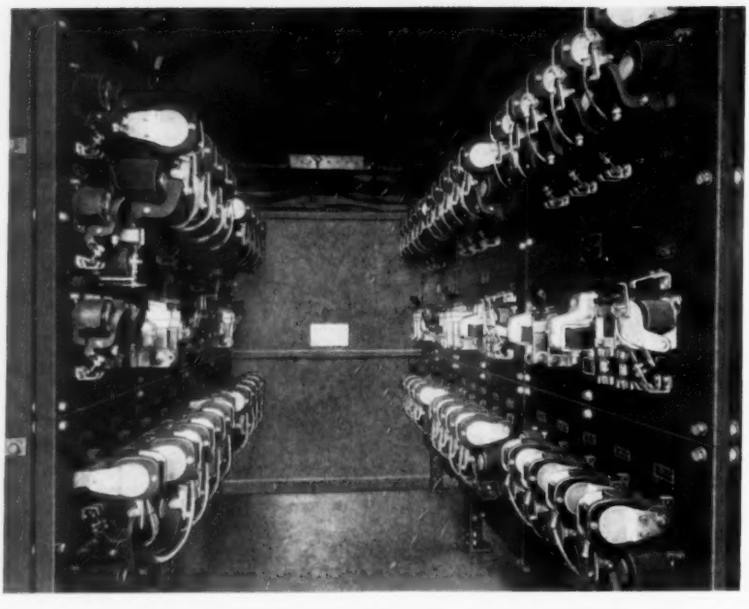
1280 to 1700 tons, 16-inch welded steel pipe, Sheridan, Wyo.; bids Dec. 19.

800 tons, four 195-foot steel barges, for Campbell Transportation Co., Pittsburgh.

Quicksilver

New York—Quicksilver prices are steady in a quiet market. Supplies are still limited. Small lots of 15 to 25 flasks continue $75.50 a flask.

CLARK..
AUTOMATIC STEEL MILL CONTROL EQUIPMENT



An installation of Clark "3C" Standard Magnetic Control complete for Hoist, Bridge and Trolley Motions of a 90 Ton Crane in Steel Mill Service.

THE CLARK CONTROLLER CO.
1146 East 152nd St.
CLEVELAND, OHIO

Transportation

Track Material Prices, Page 67

Placing of rail tonnages make up the most important feature of the railroad situation and some large lots feature the market. Southern Pacific has opened bids on 40,769 tons, its largest inquiry in several years. Distribution of the Union Pacific's 70,000-ton order, noted last week, gives 29,750 tons each to Colorado Fuel & Iron Co., Denver, and Carnegie-Illinois Steel Corp., Pittsburgh, and 10,500 tons to Inland Steel Co., Chicago. The Wabash will open bids Dec. 10 on 1671 tons of 90 and 112-pound rails, and some fastenings.

New York Central expects to be in the market within possibly ten days for 30,000 to 40,000 tons of rails and sufficient fastenings. It has completed specifications against its previous orders.

Delaware, Lackawanna & Western has placed 9000 tons of rails with Bethlehem Steel Co., Bethlehem, Pa. and 1000 tons with Carnegie-Illinois Steel Corp., Pittsburgh. Some 3300 tons of fastenings has been distributed. The budget of the Lackawanna includes 20,000 tons of rails, the remainder to be bought as needed. Long Island railroad has placed 1000 tons of rails with Bethlehem Steel Co.

New York Central has closed bids on a seven-car streamlined unit for operation, it is said, in the Cleveland district. The report is that standard steels will be used throughout. This road plans to double its car repair program to include repairs to about 3000 cars. The Lehigh Valley contemplates a substantial coal car repair program.

The Pennsylvania is taking bids from carbuilders Dec. 10 under the Clayton act. It is believed this will decide how many of the 10,000 freight cars on its program will go to outside shops. Full distribution of steel on which bids were opened last month will not be made until after the cars are distributed. This road will also open Clayton act bids Dec. 17 on routine quarterly requirements, not exceeding 5000 tons.

Sales of freight cars in November are tentatively estimated at 100.

Illinois Central will utilize a PWA loan of $3,000,000 in a freight car repair program, including 1297 steel underframe box cars, 700 composite box cars, 1050 composite automobile cars, 220 furniture cars and 1365 gondolas. Repairs will be undertaken on 141 locomtives and tenders and 56 passenger cars will be air conditioned.

In addition to the $1 a ton increase in track bolts a quantity extra of 50 cents per hundred weight is to be charged, effective with first quarter, on all shipments of 24 kegs or less of one size.

Car Orders Placed

Cerro de Pasco Copper Co., 30 ore cars, half each to Bethlehem Steel Co., Bethlehem, Pa., and Magor Car Corp., New York.

Locomotives Placed

Ferrocarril Nacional de Chiriqui, Panama, one locomotive to American Locomotive Co., New York.

Rail Orders Placed

Delaware, Lackawanna & Western, 10,000 tons, 9000 to Bethlehem Steel Co., 1000 tons to Carnegie-Illinois Steel Corp.; 3300 tons fastenings to various makers.

Long Island railroad, 1000 tons, to Bethlehem Steel Co.

Union Pacific, 70,000 tons (previously reported); Colorado Fuel & Iron Co. and Carnegie-Illinois Steel Corp. each 29,750 tons, Inland Steel Co., 10,500 tons.

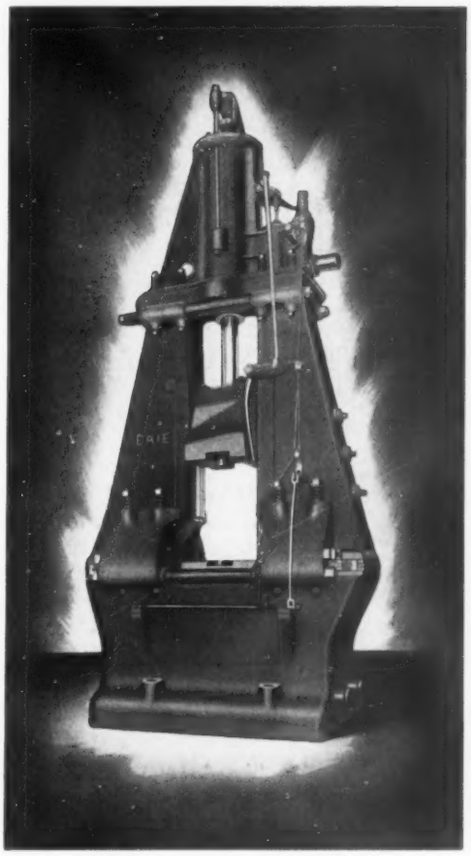
Car Orders Pending

New York Central, seven-car streamlined unit; bids in.

Rail Orders Pending

Southern Pacific, 40,769 tons; 9230

VERY GOOD — OR VERY BEST?



We don't like to use superlatives, because we are told it's not good advertising. However, if we told you merely that ERIE steam drop hammers were very good hammers, we would be guilty of gross understatement. So perhaps we are justified—particularly since it is not merely our opinion, but the expressed opinion of thousands of hammer users — in saying that ERIE steam drop hammers are the very best hammers that can be built. If there is any question in your mind about that statement, please let us know when it will be convenient for a representative to call to discuss the matter with you.

ERIE FOUNDRY COMPANY
ERIE, PENNA., U. S. A.

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ERIE

tons of 131-pound section, remainder 112-pound; bids in.

Wabash, 1790 tons 90 and 112-pound rails; also fastenings; bids Dec. 10.

Buses Booked

White Motor Co., Cleveland: Fifteen 36-passenger city coaches for Capital Transit Co., Washington; ten 22-passenger coaches for Illinois Power & Light Co., Champaign, Ill.; five 33-passenger and one 21-passenger coaches for Blue & Gray Sightseeing Tours, Washington; four 32-passenger coaches for Kings Coach Co. Inc., Elmhurst, N. Y.; four 32-passenger coaches for Hampstead Bus Corp., Mineola, L. I.; four 33-passenger intercity coaches for Carolina Coach Co., Raleigh, N. C.; four 41-passenger deluxe for G. R. Wood Inc., Pitman, N. J.; four 21-passenger intercity for DeLuxe Coach Service Co., Lodi, N. J.; three 36-passenger coaches for Montreal Tramways Co., Montreal, Que.; ten 21-passenger intercity for Buckeye Stages, Cleveland; six 36-passenger coaches for Triboro Coach Co., Long Island City, N. Y.

Chamberlain Co. Inc., 2550 East Ninth street, Los Angeles, has been appointed sales representative for Parsons Engineering Corp., Cleveland, handling sandblast and dust arrestor equipment. W. F. Haggman is manager of the foundry department of the Chamberlain Co.

Advantages of Cold-Drawn Seamless Construction by Hackney

Users of special shells, shapes, tanks, bottles, etc., find in Hackney construction advantages of considerable importance. The above tank is an example of Hackney work. Used as a water tank on concrete mixers and pavers, it has high resistance to damage from water hammer and vibration.

The entire tank, with the exception of one head, is a single piece of metal—cold-drawn, seamless. The head is strongly reinforced and welded or brazed into place.

The cold-drawing method of manufacture provides special advantages in smooth surfaces, freedom from laminations, uniformity of temper and thickness—and high-strength qualities.

Write to Hackney with data on your requirements. Possibly your needs in special shapes or containers can be met by Hackney with increased efficiency and reduced cost.

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688 Roosevelt Bldg., Los Angeles, Calif.

Hackney
MILWAUKEE

DEEP DRAWN SHELLS AND SHAPES

Sheets

Sheet Prices, Page 66

Pittsburgh—A growing volume of automobile sheet buying has placed the average of sheet producers' operations at 70-75 per cent of capacity, with a leading interest now running at 80 per cent. Many small mills are sold out on cold-rolled for four to five weeks. Despite the fact prices have been announced as unchanged for first quarter, the start of several new mills on production has made for price unsettlement in the Michigan territory. In some cases, concessions of $3 a ton have been offered to certain accounts. Most producers, however, are holding firmly to published prices.

Cleveland—Specifications from automobile manufacturers have slackened somewhat but are expected to increase soon after Jan. 1, as efforts are being made to hold down inventories. Mills in Cleveland and in an adjacent lake district serving the Michigan automobile district, however, continue operating near capacity. Refrigerator manufacturers are taking more material than in recent weeks, and miscellanecus demand is sustained.

Chicago—While sheet consumers are less insistent on heavier shipments during the balance of December, due to the lack of price changes for first quarter, mills continue busy and unfilled orders will support an active rate of operations during the larger portion of this month. Automotive deliveries are heavy, though some tonnage originally expected to be taken this month for future requirements likely will not be moved until January. Consumption among miscellaneous users is well maintained.

Boston — Demand for sheets is steady and well distributed. Blue annealed are slightly more active. Covering for next quarter is moderate. Consumers are experiencing some difficulty in securing prompt delivery of some finishes.

New York — While sheet sellers are able to supply some standard sizes of hot rolled and galvanized sheets from stock for delivery this year, most new orders are for first quarter. T. Eggleston Bros., jobbers, Long Island City, New York, are low on 1600 tons of No. 24 gage pickled blue sheets for New York state license tags.

Philadelphia — Sheet contracting for first quarter is getting under way rather briskly in cold-finished material, consumers endeavoring to ob-

taining good positions on rolling schedules.

Buffalo—Sheet production here continues at 90 per cent. Only the shortest necessary holiday will be taken at Christmas.

Youngstown, O.—Instead of a letdown in specifications, valley sheet mills are being flooded with them. November shipments exceeded October by 40 per cent. Niles Rolling Mill Co. has started a new galvanizing plant at Niles, O.

Cincinnati—Buying is unabated and some orders are being taken for January delivery. Mill operations are near capacity.

St. Louis—Some tapering in demand is noted, particularly in galvanized material. Specifications have declined during the past two weeks, except on automotive sheets.

Birmingham, Ala.—Sheets production is steady with prospects of going well into the new year. Shipments about equal output.

Pipe

Pipe Prices, Page 67

Pittsburgh—Early last week pipe producers had definitely formulated a price policy for the first quarter, all discounts on tubular products to be unchanged from present rates. However, the $2 a ton increase in all three grades of skelp will be effective, as will a new system of width and gage extras.

Chicago—Cast pipe producers continue flooded with requests for bids on various PWA and WPA projects. In a number of the former, contractors' bids were submitted some time ago, and with higher labor costs prevailing, original grants now are found to be inadequate. December is likely to be the most active month of the year in pipe sales, provided orders are forthcoming for a sizeable portion of the tonnage now pending. Cincinnati has taken bids on 5730 tons of various sizes and now is inquiring for a substantial tonnage for a filter plant. Action is deferred on proposed changes in cast pipe prices.

Contract has been awarded by Continental Oil Co. to E. R. McCarthy Pipe Line Contracting Co., Tulsa, Okla., for flame beveling and relaying by Lindeweld method an old 16-mile, 10-inch, 32-pound mechanically coupled pipeline with terminal at Fairfax, Okla.

Boston—Cast pipe buying is heavier, several thousand tons being closed in the last week or 10 days at generally steady prices.

Youngstown, O.—Line pipe orders are for small tonnages. Merchant pipe is picking up as jobbers replenish stocks.

Birmingham, Ala.—Cast pipe producers are averaging over 50 per cent output and new business for PWA projects is considerable. Shipments are active. Anticipated increase in price of pipe is awaited.

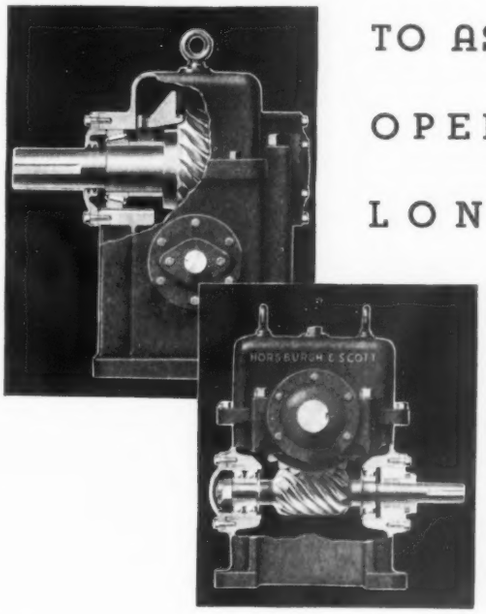
San Francisco—Over 14,000 tons of cast pipe is now up for figures or pending. So far this year 30,007 tons have been placed, compared with 41,914 tons for the same period a year ago. Bids have been opened on 2298 tons for Los Angeles. On an inquiry for 2216 tons of cast iron pipe or welded steel pipe, the Vista Irrigation District, Vista, Calif., purchased the latter.

Seattle—Requests for figures continue heavy as many Pacific Northwest communities have had projects approved by PWA. Awards during December will be the heaviest of the year.

Cast Pipe Placed

1025 tons, 10-inch and under, West Newbury, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

ACCURATE...



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750 tons, 12-inch, Northboro, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

750 tons, 12-inch and under, to United States Pipe & Foundry Co., Burlington, N. J.

485 tons, 6 and 10-inch, Latham water district, Colonie, N. Y., to United States Pipe & Foundry Co., Burlington, N. J.; Solomon & Keis, Troy, N. Y., consulting engineer.

250 tons, 6 to 10-inch, Easton, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

154 tons, 16-inch, San Diego, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

5730 tons, various sizes, Cincinnati; United States Pipe & Foundry Co., Burlington, N. J., low.

4300 tons, 16-inch, Sheridan, Wyo.; bids Dec. 19 for cast iron or welded steel pipe.

2216 tons, 8 to 26-inch, Vista Irrigation district, Vista, Calif.; welded steel pipe purchased.

850 tons, 10 to 16-inch, Oakland, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

321 tons, 4 to 8-inch, Dos Palos, Calif.; P. L. Burr, San Francisco, low on general contract.

100 tons, 3 and 4-inch, Whitney, Idaho; bids opened.

Unstated tonnage, Cincinnati filter plant; bids Dec. 19.

Behind the Scenes with STEEL

Volga Engineer

MORE headaches for our foreign language department appeared imminent the other day after receipt of a note from one A. Goldberg, 2824 West Fourteenth street, Cleveland. To our undiscerning eye it appeared like the result of turning a covey of ants with inked feet loose on a page of paper, but our linguists soon informed us it was Russian. Mr. G. wrote:

> I should like to have printed in your magazine a series of articles describing the newest rolling-machine plants in the U.S.S.R. Especially do I wish to write about: 1) Continuously providing department of the Magnitogorsk plant; 2) the department 20", 12", and 10" of the same plant; 3) the continuous strip mill of the plant Zaporozhstal, and many other divisions . . . . .
>
> These articles I shall have to write in Russian only.
>
> *Truly yours,*
> A. GOLDBERG,
> *Rolling-machines engineer of the U.S.S.R. in the U. S. on observation tour.*

Certainly very nice of Mr. G., but we're afraid that a long article in

Russian would just about lick our translators, who are all very frail fellows anyhow. If Mr. G. will turn to page 32 in this issue he will see a complete description of the "continuous strip mill of the plant Zaporozhstal." In English, too, and exclusive in STEEL.

We suppose, however, that English to Mr. G is just as silly looking as Russian to us. He could have a lot of fun studying the pictures, though.

• • •

Hic Jacet

WE SHED a professional tear at the passing of STEEL'S 12-year old "Large Uses of Steel in Small Ways" department, which met its demise in the Nov. 25 issue following its 300th appearance.

The department was 12 years old practically to the day. Born Nov. 23, 1923, it interested thousands of readers every other week during the eventful period of its existence. In latter months it developed a strange malady diagnosed as malignant ossification and on Nov., 25 uttered its last words.

Its memory has been perpetuated in two volumes, one containing 51 and the other 93 articles reprinted from the series. We also have a supply of mimeographed sheets listing all subjects covered in the series, together with the dates of publication in *Iron Trade Review* and its offspring STEEL.

Uses of steel, both in large and small ways, have become so manifold and are expanding so rapidly that they require greater attention than a single page every other week; henceforth our editors promise increased concentration on searching out and describing these uses, which is simply an extra dividend for you, you lucky reader.

• • •

Striking

MORE news from Burma, via the *Rangoon Gazette*, in a column titled "Accidents and Incidents":

> Ma Thein Tin, 22, Burmese woman, went to the house of her husband's lesser wife to ask her husband for a basket. Her husband came out and, it is alleged, struck her. Ma Thein Tin attended hospital later to have her injuries treated.

Looks like instead of getting the basket, she got the gate. We'll have to tell our lesser wife about that one.

• • •

Ooze

THE UNCEASING OOZE FROM EVERY PORE—blazoned a double-truck message from USSteel Corp. in the Dec. 2 issue.

It stopped us dead in our tracks, and we read on with interest. But a second reading of that headline made us unconsciously feel a bit sticky, so we went home and took a protracted bath.

Mention of ooze moved Associate Editor G. H. M. to recall that stanza from the Rubaiyat, to wit:

Whether at Nasipur or Babylon,
Whether the cup with sweet or bitter run,
The wine of life keeps oozing drop by drop,
The leaves of life keep falling one by one.

—SHRDLU

Strip Steel

Strip Prices, Page 67

Pittsburgh—The market remains officially quoted at 1.85c, base, Pittsburgh, for hot-rolled strip and 2.60c, Pittsburgh or Cleveland, for cold-rolled, and some first-quarter requirements of important buyers have been negotiated at these prices. On the other hand, the market is not strong in view of offers to sell at less by certain producers serving one or two important Michigan users. Now that first-quarter prices have been announced as unchanged from the preceding, some requirement orders have been closed for the coming three months.

Cleveland — Automobile parts-makers have increased the size of their orders and are urging prompt shipment. Miscellaneous specifications are fair. Contracting for first quarter is getting under way slowly since prices were extended.

Chicago—Strip specifications are slightly less active, though shipments continue heavy. A further letdown in demand is in prospect for the next several weeks, due to seasonal reasons and to the fact that consumers now lack incentive to anticipate first quarter needs.

Boston—Cold strip demand for holiday specialties has tapered sharply, although active demand continues with mill operations around 70 per cent. Buying is still confined largely to specialty material, narrow sizes predominating.

Youngstown, O.—Makers of hot and cold-rolled strip find themselves well sold through December and into January.

Metallurgical Coke

Coke Prices, Page 67

The domestic coke market is opening up to its heaviest extent since early 1935, and both beehive and by-product coke producers are experiencing a brisk demand and firmer prices. Connellsville coke production has been running around 10,000 to 10,500 tons per week recently. On beehive metallurgical coke the market is firm at $3.65 to $3.75 a ton, f.o.b., ovens, with foundry grades ranging $4.25 to $4.40, and premium foundry coke, $5.50 to $5.75.

Foundry coke shipments at Chicago and Cincinnati are well sustained as foundry operations hold their rate. New England by-product coke has been advanced 50 cents per ton to $12, delivered, for first half. Birmingham, Ala., producers are operating better since the coal strike ended.

Shapes

Structural Shape Prices, Page 66

New York—Structural steel inquiry is heavier with the revival of the 12,000-ton west side elevated highway project, closing Dec. 18, following one postponement. Awards include approximately 8000 tons, the largest 4600 tons to American Bridge Co., Pittsburgh, for the Seventy-ninth street, New York, grade elimination and structures. Bridge requirements are heavier. Pending school needs are close to 3000 tons on which bids are in.

Pittsburgh — Fort Pitt Bridge Works, Pittsburgh, has taken contracts to fabricate 1270 tons for the Northeast high school, Philadelphia, and 430 tons in a Clearfield county, Pennsylvania, state highway bridge. Among new inquiry is the 700-ton bridge at Grundy, Va., for the Norfolk & Western railroad, 1030 tons in a state highway bridge at Frankfort, Ky., and other state bridge work. Plain structural shapes are 1.80c, Pittsburgh, and steel sheet piling, 2.15c, base, Pittsburgh.

Cleveland—The market is more active, mainly for public work projects, including 750 tons for 12 Cleveland public schools on which bids are being taken. Several moderate size industrial buildings were awarded during the week.

Chicago — Specifications for plain material continue to improve, but awards of fabricated steel are light. Inquiries and pending work are heavy, due principally to the activity in WPA projects. Bids will be taken shortly on 20 grade separations in Chicago and suburbs, with additional work of this nature being figured for other points in Illinois and nearby states. While Dec. 15 is the dead line for taking of bids on WPA work, a part of this program is expected to be deferred for several weeks.

Boston—While there has been a moderate increase in structural steel demand, more work is coming into the market, notably schools, most of them having been bid by general contractors. Awards include approximately 750 tons, two of the largest contracts, a school, Boston, and a Maine bridge, the latter 245 tons going to shops outside the district.

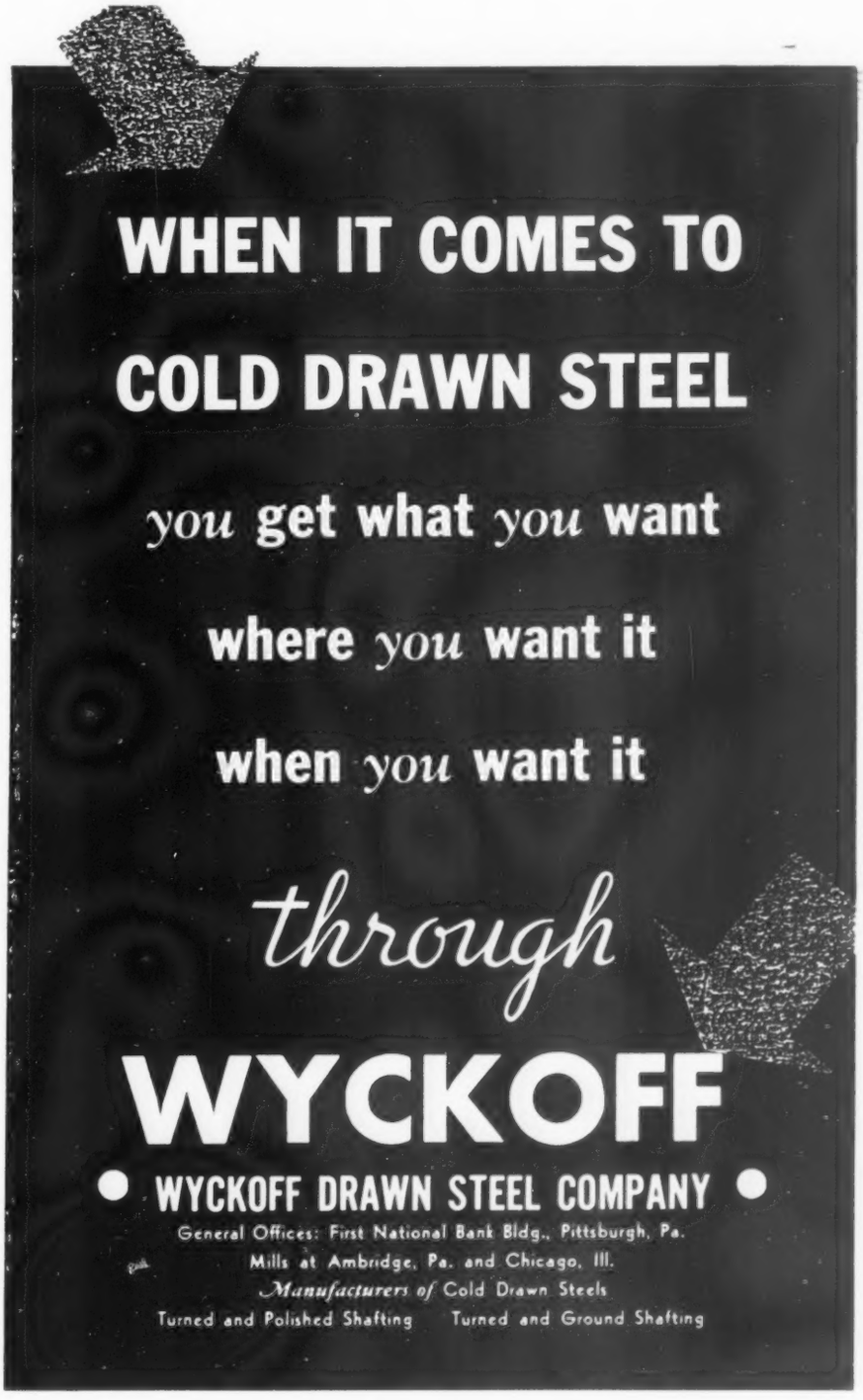
Philadelphia—Fabricators are deluged with school and other government financed projects. Bids will be opened the week of Dec. 9 on 87 school projects in eastern Pennsylvania. A few represent only alterations and foundation work, but in a number of instances fair size tonnages are required. Possibly the largest prospective job is 5000 tons for a Philadelphia vocational school.

Cincinnati — Distillery expansion in this district is accountable for part of the increased activity among steel fabricators. One company will soon award the general contract for a 500-barrel distillery, requiring considerable steel. Another distillery will build an additional warehouse, both structures at Lawrenceburg, Ind.

San Francisco—The only shape letting of importance was placed with Consolidated Steel Corp. and called

Shape Awards Compared

	Tons
Week ended Dec. 7	23,235
Week ended Nov. 30	21,229
Week ended Nov. 23	12,209
This week, 1934	5,551
Weekly average, 1934	16,284
Weekly average, 1935	16,655
Weekly average, November	18,746
Total to date, 1934	832,392
Total to date, 1935	827,505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where you want it
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through
WYCKOFF
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General Offices: First National Bank Bldg., Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.
Manufacturers of Cold Drawn Steels
Turned and Polished Shafting
Turned and Ground Shafting

for 910 tons for two pumping units for the metropolitan water district, Los Angeles.

Seattle — Increasing demand is noted as numerous projects are definitely up for figures. Tonnages pending are larger than any previous time this year.

Shape Contracts Placed

4600 tons, grade elimination and structures, Seventy-ninth street, New York, to American Bridge Co., Pittsburgh; Frederick Snare Corp., New York, general contractor.

3150 tons, state highway bridge, Hammond, Ind., to McClintic-Marshall Corp., Bethlehem, Pa.

1500 tons, two 300-ton cranes for Bonneville, Oregon, dam, to Harnischfeger Sales Corp., Milwaukee.

1270 tons, Northeast high school, Philadelphia, to Fort Pitt Bridge Works, Pittsburgh.

1125 tons, angles, channels, tees and I-beams, light cruiser being built at navy yard, Brooklyn, N. Y., divided: Bethlehem Steel Co., Bethlehem, Pa.; Phoenix Iron Co., Phoenixville, Pa.; Carnegie-Illinois Steel Co., Pittsburgh; Joseph T. Ryerson & Son Inc., Jersey City; Jones & Laughlin Steel Corp., Pittsburgh; Lehigh Structural Steel Co., Allentown, Pa., and Ross Galvanizing Co., Philadelphia. This is schedule 6098, bids Oct. 15.

910 tons, two pumping units, metropolitan water district, Los Angeles, to Consolidated Steel Corp., Los Angeles.

845 tons, bridge No. 252-2-4 Burnett county, Texas, to Virginia Bridge & Iron Co., Birmingham, Ala.

700 tons, bridges, Chicago, Burlington & Quincy railroad, to American Bridge Co., Pittsburgh.

600 tons, bridge, Eagle Creek, Oreg., to Poole & McGonigle Inc., Portland, Oreg.

600 tons, piling, Triboro bridge, New York, about equally divided between Carnegie-Illinois Steel Corp. and Jones & Laughlin Steel Corp. This is a redivision of award recently reported placed with Jones & Laughlin Steel Corp., and originally placed in Germany.

575 tons, wall armor, Pickwick Landing, Tenn., to American Bridge Co., Pittsburgh.

570 tons, bridge, El Paso county, Colorado, to Minneapolis-Moline Power & Implement Co., Minneapolis.

480 tons, building, Rhode Island School of Design, Providence, R. I., to James H. Tower Iron Works, Providence; through James Stewart & Co., New York.

480 tons, building, Sterling, Ill., for Northwestern Barbed Wire Co., to Joseph T. Ryerson & Son, Chicago.

450 tons, piling, bulkhead wall, East river drive from East 119th street to East 124th street, Triboro bridge, New York, to Carnegie-Illinois Steel Corp., Pittsburgh; through Merritt-Chapman & Scott Co.

430 tons, Pennsylvania state highway bridge, Clearfield county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh; through H. A. McBurney, Pittsburgh, on general contract, bids Nov. 1.

380 tons, Sabine river bridge, Texas, to Virginia Bridge & Iron Co., Birmingham, Ala.

360 tons, two state highway bridges, Batavia, Mich., and Temperance, Mich., to McClintic-Marshall Corp., Bethlehem, Pa.

325 tons, state bridge, Auburn-Elbridge highway 592, Cayuga county, New York, to McClintic-Marshall Corp., Bethlehem, Pa.; Edward Smith Engineering & Construction Co., Syracuse, N. Y., general contractor.

320 tons, two state highway bridges, Hartland, Vt., and St. Albans, Vt., to Vermont Structural Steel Corp., Burlington, Vt.

315 tons, state highway bridge, Auburn, N. Y., to McClintic-Marshall Corp., Bethlehem, Pa.

300 tons, miscellaneous bridges, Harlan county, Nebraska, to St. Joseph Structural Steel Co., St. Joseph, Mo.

254 tons, grade separation, Southern State Parkway and Central Park avenue on Bathpage parkway, Nassau county, New York, to Phoenix Bridge Co., Phoenixville, Pa.; Good Roads Engineering & Contracting Co., Wantagh, N. Y., general contractor.

245 tons, state bridge, Leeds-Turner, Maine to Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa., Stewart & Ripley Inc., general contractor.

240 tons, reconstruction of bridge, Beaver county, Pennsylvania, to Pittsburgh Bridge & Iron Works, Rochester, Pa.

225 tons, garage, Bordens Farm Products Co., Mount Vernon, New York, to McClintic-Marshall Corp., Bethlehem, Pa.

220 tons, garage, Mt. Vernon, N. Y., for Bordens Farm Products Co. to McClintic-Marshall Corp., Bethlehem, Pa.

220 tons, Robert Gould Shaw school, Roxbury district, Boston, Mass., to Bethlehem Fabricators Inc., Bethlehem, Pa.

200 tons, postoffice addition, Winston-Salem, N. C., to Carolina Steel & Iron Co., Greensboro, N. C.; Virginia Engineering Co., Newport News, Va., general contractor. West Virginia Steel Co., Huntington, W. Va., awarded 60 tons of reinforcing steel.

200 tons, state armories, Westfield and Orange, N. J., to Selbach-Meyer Co., New York.

190 tons, state highway bridge, Pleasant Valley, N. Y., to Harris Structural Steel Co., New York.

175 tons, Whiskey island federal housing project, Cleveland, to Republic Structural Iron Works, Cleveland; through Madsen Construction Co.

175 tons, Main street bridge, over tracks, New York, New Haven & Hartford railroad, Weymouth, to Boston Bridge Works Inc., Cambridge, Mass.; Bradford Weston, Hingham, Mass., general contractor.

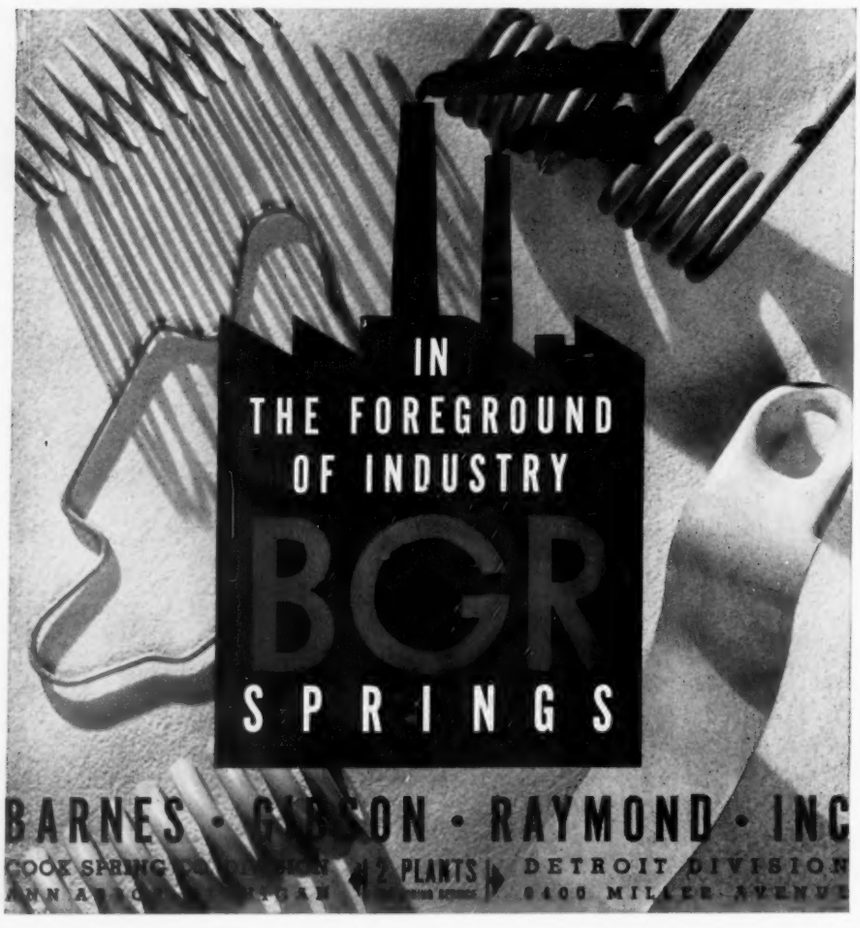
166 tons, mill building, Rock Hill Printing & Finishing Co., Rock Hill, S. C., to Southern Engineering Co., Charlotte, N. C.; Fiske-Carter Construction Co., Spartanburg, N. C., general contractors.

155 tons, Long Hill state bridge, Groton, Conn., to Harris Structural Steel Co., New York; through Smith Construction Co., Derby, Conn.

150 tons, gymnasium building, Amherst college, Amherst, Mass., to Haarmann Steel Co., Holyoke, Mass.; through C. T. Wills Inc., New York, general contractor.

150 tons, three structures for Michigan Alkali Co., Wyandotte, Mich., to Fort Pitt Bridge Works. This is in addition to 600 tons recently awarded to Wisconsin Bridge & Iron Co., North Milwaukee, Wis.

150 tons, state bridge, F.A.P.-182-F, Hughes county, Oklahoma, to Capital Steel & Iron Works, Oklahoma City.



145 tons, viaduct, Jefferson county, Nebraska, to Omaha Steel Works, Omaha.
130 tons, Galena street state bridge, Spokane, Wash., to unnamed eastern fabricator; Sather & Son, Seattle, general contractor.
115 tons, building, National Carbon Co., Fostoria, O., to Fort Pitt Bridge Works, Pittsburgh.
115 tons, Belle Fourche river bridge, Wyoming, to Midwest Steel & Iron Co., Denver.
115 tons, airplane hangar, treasury department Lakeland, Fla., to Ingalls Iron Works, Birmingham, Ala.
100 tons, addition to Bellingham, Wash., state normal school, to Isaacson Iron Works, Seattle.

Shape Contracts Pending

12,000 tons, west side elevated highway, Forty-ninth to Fifty-ninth street, New York; new bids close Dec. 18.
5000 tons, vocational school, Philadelphia, foundation bids this week.
4925 tons, Missouri river bridge, Weldon Spring, Mo.: Kansas City bridge Co., Kansas City, Mo., low.
1750 tons, public school 49, New York; John Kennedy Co., New York, low on general contract.
1650 tons, auditorium, Oklahoma City, Okla.
1340 tons, five state bridges, New Jersey; bids Dec. 16.
1300 tons, Livestock building, San Francisco; bids opened.
1300 tons, seven schools, Philadelphia; bids week of Dec. 9.
1030 tons, state highway bridge, Frankfort, Ky.
1000 tons ,state bridge, Guilford avenue, Baltimore; bids Dec. 10.
1000 tons, high school, Scranton, Pa.; also 650 tons of bars.
1000 tons, plant addition, Ludlow Mfg. Co., Edgemore, Del.
900 tons, state bridges, Indiana; bids Dec. 10.
800 tons, postal station, Madison Square, New York; DMW Constructing Co. Inc., Brooklyn, N. Y., low.
795 tons, Figueroa street crossing, Los Angeles; bids Dec. 19.
750 tons, 12 public schools, Cleveland; bids being taken; also, 250 tons of reinforcing bars.
700 tons, Norfolk & Western railroad bridge, Grundy, Va.
600 tons, state bridges, Illinois; bids Dec. 13.
575 tons, state bridges, Texas.
550 tons, four state highway bridges, scattered locations, North Carolina.
500 tons, undercrossing, Mission road, Los Angeles; bids Dec. 19.
438 tons, undercrossing, Soto street, Los Angeles; bids Dec. 19.
360 tons, school, Reading, Pa.; bids in.
325 tons, bridge, Battle Creek, Mich.
315 tons, West Dravus street, Seattle, state bridge; bids at Olympia, Wash., Dec. 17.
278 tons, state bridge, Skamania county, Washington; bids Dec. 17.
250 tons, Will Rogers theater, Balaban & Katz Corp., Chicago.
200 tons, armory, Rockford, Ill.
200 tons, school gymnasium, Williamsport, Pa.
188 tons, Queen Annue bridge, Seattle; General Construction Co., Seattle, low.
185 tons, sheet piling, flood wall, Allentown, Pa.; bids Dec. 11.
171 tons, state bridge Thurston county, Washington; C. L. Creelman, Seattle, general contractor.
150 tons, school, Wyoming, Pa.; bids soon.
150 tons, state hospital, Westfield, Mass.
140 tons, garage for Cleveland public library; bids being taken.
129 tons, 200 foot, riveted state bridge, Kittitas county, Washington; bids in.
125 tons, two bridges, Ben Lomond, Calif.; bids Dec. 18.
110 tons, state bridge Grant county, Washington; bids Dec. 17.
110 tons, school, Palmyra, Pa.; bids soon.
100 tons, theater and commercial building for A. A. Treuhaft, Mayfield road, Cleveland Heights, O.; bids being taken.

Reinforcing

Reinforcing Bar Prices, Page 67

New York—Award of approximately 1200 tons for the Seventy-ninth street grade elimination and structure through Frederick Snare Corp., New York, leads reinforcing steel tonnage. Inquiry for New Jersey highways and bridges is much heavier, bids being in on several hundred tons. Awards are about keeping pace with new active work, holding up well.

Pittsburgh — Producers of new billet steel bars in this district were interested in the requirements of the federal government for a FERA prejject in Los Angeles, 15,000 tons, on which bids were closed Dec. 5. Pennsylvania state highway work continues with weekly lettings. The market remains quoted 2.05c, base, Pittsburgh, for carload lots by distributors, but a number of price irregularities continue, especially for large tonnages.

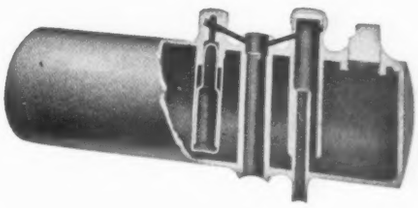
Cleveland — Many inquiries are being received for small lots of reinforcing bars, both for public and private work. Cleveland school buildings financed with government funds will require about 250 tons, on which bids are being taken.

Chicago—Concrete bar inquiries continue more active than orders,

Concrete Awards Compared

	Tons
Week ended Dec. 7	6,095
Week ended Nov. 30	2,985
Week ended Nov. 23	4,935
This week, 1934	2,230
Weekly average, 1934	4,084
Weekly average, 1935	6,799
Weekly average, November	7,369
Total to date, 1934	209,051
Total to date, 1935	339,940

CROSBY STAMPINGS



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Branch Offices
New York Chicago Philadelphia Detroit Cleveland

due to the rush in taking bids on WPA work. A large number of grade separations are included in the work relief program for Illinois, and bids are supposed to be taken on these Dec. 15, though action on some necessarily will be deferred. Orders include 650 tons for a University of Illinois building here.

Boston—Bridges account for the bulk of pending reinforcing steel volume, although foundations for two housing developments in the Boston district take approximately 300 tons. Tank foundations are included among small lots. Prices are steadier.

Philadelphia — Despite light awards, a heavy tonnage of reinforcing bars is pending. Bids will be taken on 80 schools in eastern Pennsylvania during the week of Dec. 9. These projects require ten to 650 tons each. John McShain, Philadelphia is low for the general contract on the federal housing project Atlantic City, N. J., taking a substantial tonnage of bars.

San Francisco—Reinforcing bar awards were the largest in over a month and totaled 2385 tons, bringing the aggregate for the year to 200,534 tons, compared with 97,576 tons for the same period last year. This is the first time in the history of the industry on the Pacific coast that more than 120,000 tons have been placed within any one year.

Seattle — New projects are coming out for figures in increasing volume, due largely to federal and state work.

Reinforcing Steel Awards

1100 tons, San Pablo avenue undercrossing, Oakland, Calif., to Soule Steel Co., San Francisco.

800 tons, grade elimination and structures, West Seventy-ninth street, New York, to Kalman Steel Corp., Bethlehem, Pa.; through Frederick Snare Corp.

700 tons, First avenue south overcrossing, Seattle, to Northwest Steel Rolling Mills, Seattle; P. P. Gjarde, Seattle, general contractor.

475 tons, state bridge, Newbury-Newburyport, Mass., to Northern Steel Co., Boston; through M. McDonough Co., Saugus, Mass.

345 tons, highway mesh, Gouvernour-DeKalb highway and junction, St. Lawrence county, New York, to Wickwire-Spencer Steel Co., New York; through Louis Mayersohn, Albany, N. Y.

300 tons, bars and wire mesh, Tacoma, Wash., pipe line extension, to unnamed interests; American Concrete Pipe Co., Tacoma, general contractor.

275 tons, highway mesh, Clayton-Redwood-Alexandria Bay, Jefferson county, New York, to Wickwire-Spencer Steel Co., New York; through M. K. Engineering Co. Inc., Albany, N. Y.

275 tons, Rahway Valley sewage disposal plant, New Jersey, to Truscon Steel Co., Youngstown, O.; through George Kelley, Yonkers, N. Y., general contractor.

250 tons, subway, Fortieth to Forty-seventh street, Sixth avenue, Manhattan, New York, to Truscon Steel Co., Youngstown, O.; through Rosoff-Brader Construction Co., New York.

237 tons, store house, Presidio, San Francisco, to Soule Steel Co., San Francisco.

169 tons, bars and mesh, highway project, including grade separation, Nassau county, New York, to American Steel & Wire Co., New York; Good Roads Engineering & Contracting Co., Wantagh, N. Y., general contractor.

167 tons, state crossings in four counties in Montana, to unnamed interests.

157 tons, state crossing at McCammon, Bannock county, Idaho, to unnamed interest.

145 tons, mill building, Rock Hill Printing & Finishing Co., Rock Hill, S. C., to Easterby & Mumaw, Charlotte, N. C.; Fiske-Carter Construction Co., Spartanburg, N. C., general contractors.

136 tons, supplementary joint trunk sewer for disposal plant, Elizabeth, N. J., to Truscon Steel Co., Youngstown, O.; through J. L. Boyle Engineering & Construction Co., Newark, N. J.

130 tons, Sixth avenue grade separation, Spokane, Wash., to Northwest Steel Rolling Mills, Seattle.

125 tons, reconstruction of bridge, Beaver county, Pennsylvania, to W. N. Dambach, Pittsburgh; through A. V. Beatty, East Liverpool, O.

106 tons, natatorium, Hayward, Calif., to Truscon Steel Co., San Francisco.

104 tons, state crossing at Naples, Boundary county, Idaho, to unnamed interest.

100 tons, state crossings in Gallatin and Cascade counties, Montana, to unnamed interests.

Reinforcing Steel Pending

11,350 to 22,750 tons, United States engineers office, Los Angeles; bids opened.

3226 tons, place, wash siphons, All-American Canal System, Yuma, Ariz.; Frazier-Davis Construction Co., St. Louis, low at $489,537.

2000 tons, highways and bridges, New Jersey; bids closing Dec. 4, 9 and 15. Work placed late in November with contractors to be readvertised.

1275 tons, place, specification 630, Seminole dam, Casper-Alcova project, Wyoming; Morrison-Knudsen Co. Inc., Utah Construction Co. and Winston Bros., San Francisco, low on general contract at $4,374,240.

1200 tons, west side elevated highway, Forty-sixth to Fifty-ninth streets, New York; again up for bids Dec. 18, first bids having been withdrawn.

715 tons, Figueroa street crossing, Los Angeles; bids Dec. 19.

650 tons, medical and dental college building, Chicago, for University of Illinois.

600 tons, four New Jersey state highways; bids opened Dec. 4.

500 tons, Ogden river project; bids Dec. 20 to reclamation bureau, Ogden, Utah.

420 tons, overhead crossing, Tracy, Calif.; Lindgren & Swinerton, San Francisco, low on general contract.

400 tons, state road work, Pennsylvania; bids opened Dec. 6.

335 tons, undercrossing, Mission road, Los Angeles; bids Dec. 19.

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270 tons, state hospital units, Westfield, Mass.

267 tons, Sunshine Buena Vista school, San Francisco; general contract to Anderson & Ringrose, San Francisco.

250 tons, metropolitan sewer, Medford, Mass.; bids in Dec. 5.

117 tons, also 51 tons of bolts, plates, etc., Port Angeles, Wash., bridge project; bids in.

100 tons, Skykomish river, Washington, state bridge; bids at Olympia, Wash., Dec. 3.

100 tons, West Dravus street bridge, Seattle; bids at Olympia, Wash., Dec. 17.

Unstated tonnage, 80 schools in eastern Pennsylvania, 10 to 650 tons each; bids week of Dec. 9.

Unstated, addition to Medical Lake, Wash., state hospital; Sheble Construction Co., Seattle, low.

Unstated, addition to state hospital, Salem, Oreg.; Dougan-Hammond Construction Co., Portland, Oreg., low.

Unstated, Henderson street and Montlake trunk sewers, Seattle; bids Dec. 10 and 11.

Unstated, state highway department headquarters, Washington; West Coast Construction Co., Seattle, general contractor for Wenatchee project, and H. C. Boyer, Olympia, general contractor for Vancouver project.

Unstated, addition to state hospital, Steilacoom, Wash; general contract to Martin H. Marker, Tacoma, Wash.

Cold Finished

Cold Finished Prices, Page 67

Pittsburgh—The $3 per ton advance at all five basing points in cold-finished steel bars, effective Jan. 1, 1936 will cause some buying on the part of consumers before that date. This advance, in changing the Pittsburgh base price from 1.95c to 2.10c, restores the reduction made in cold-drawn bars last April. Extras for chemical composition have been reduced, also for effect with the first quarter, with standard analysis bessemer screw stock base; open-hearth screw stock taking a $2 per ton extra; a $4 a ton extra for high manganese open-hearth screw stock not exceeding 0.25 carbon and a manganese range of 0.80 to 1.55; a $7 a ton extra for high manganese open-hearth screw stock with carbon 0.26 to 0.50 and manganese 0.80 to 1.65. On cold-drawn bars, S.A.E. specifications 1030 to 1050 inclusive will take an extra of $2 and S.A.E. 1010 to 1025 will be base.

Chicago—While the base price on cold-finished bars has been advanced $3 a ton to 2.15c, Chicago or Gary, the accompanying reduction of $3 a ton in chemical extras results in no change in the net price on most tonnage. Bessemer screw stock, which formerly carried an extra of $3 a ton, now takes the new base price, with no extra.

Philadelphia—Cold-finished bar sellers expect good releases this month on flats, shafting and non-specification material, the items affected by the advance of $3 per ton to go into effect Jan. 1.

Wire

Wire Prices, Page 67

Pittsburgh—Orders for wire products diminished last week due to the failure of a price increase to develop for effect with the first quarter. There is less disposition to anticipate requirements and lay in inventory. On the other hand, current requirements proceed at a good pace.

Cleveland—Specifications for manfacturers' wire show a further moderate decline, as with prices unchanged for first quarter consumers are restricting inventories. Production, however, is holding well above the average here for this time of the year. Little demand is coming from agricultural districts.

Chicago—Wire consumers are less pressing in requests for shipments, due to the extension of present prices into first quarter. Deliveries remain fairly active, but new buying is quieter since previous purchases in a number of instances will cover consumers into January.

Boston—Wire buying is broader, specialties and manufacturers' wire still leading. While utilities are not buying much heavy material, such consumers are taking lighter electrical goods in better volume. Prices are steady and unchanged.

New York—Demand for wire and wire products is tapering as the end of the year approaches. Specifications from automotive accessory manufacturers continue good.

Semifinished

Semifinished Prices, Page 67

At the same time producers will apply the $2 per ton increase in grooved, sheared, and universal skelp at all six basing points, a new series of extras for width and gage also will be posted for the first time. Base is in widths of 12 to 20 inches inclusive, regardless of gage, with extras from 0.025c per pound up to 0.325c per pound as gage and width decreases. This move will regulate the competitive situation of skelp with plates, bars, sheets and strip, as in these four latter products extras for width and gage have been in force.

The $2 a ton increase in other forms of semifinished steel, such as sheet bars, rerolling billets, and wire

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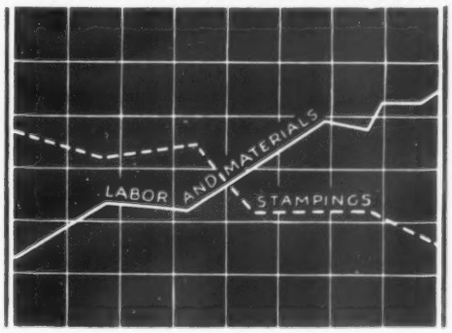

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rods, still is being quoted for first quarter, but nonintegrated steel producers are beginning to present considerable pressure in view of the fact that finished steel prices were not advanced. Nominally, sheet bars are $30, base, Pittsburgh; rerolling billets, $29; and common wire rods, $40, but without test.

Youngstown, O.—Despite pressure from the smaller consumers of sheet bars and billets, mills in this district are strongly opposed to dropping the recent $2 advance on these products.

Pig Iron

Pig Iron Prices, Page 68

Cleveland — Although books for first quarter were opened Dec. 2 few contracts were placed during the past week. Melters have considerable iron due them on present commitments made prior to the $1 a ton price advance Nov. 1. Shipments on these continue heavy, and for some makers show a slight gain over the November average. As current prices will extend into the first quarter consumers have no immediate incentive in covering for that period. Orders generally have been restricted to carload lots.

Republic Steel Corp.'s Corrigan, McKinney division lighted its fourth blast furnace, operating this department 100 per cent, as well as having on all of its 14 open hearths.

Youngstown, O.—Small lots of No. 2 foundry and malleable are being sold here at an advance of $1 a ton over the recent increase, or at $20.50, furnace. The bulk of the pig iron tonnage moving under contract still is being delivered at $19.50. Demand is brisk, with few merchant stacks blowing.

Pittsburgh—Despite heavy shipments, later than Jan. 1 may be required to complete the orders for pig iron which several buyers placed before the Nov. 1 price advance. A test of the advance, therefore, may be delayed until late January, or possibly February.

Chicago—Shipments continue active, with gains shown over the movement during the corresponding period of preceding months this year. Consumption is steady or slightly higher. Less iron will be carried over for first quarter consumption than was anticipated. First quarter contracting is fairly active, in view of the extensive forward coverage that was done during September and October. The market is steady at $19.50, furnace, for No. 2 foundry and malleable.

Boston—Shipments against contracts placed previous to the last $1 advance are heavy, with new buying light. It is evident most consumers will take in as much tonnage possible at old prices before Dec. 31, otherwise unshipped needs are cancelled or carried over at the higher price.

Buffalo—Buyers are taking shipments at a rate indicating there will be little business remaining on books by Dec. 31. First quarter buying has not started in volume.

Philadelphia—While new buying is slow, shipments against orders placed at old prices continue heavy.

Cincinnati—Furnace interests are pressing for specifications on pig iron bought before the price rise, calling for late December delivery. A slight recession was noted in the movement last week.

St. Louis—The rate of pig iron shipments thus far in December is about on a parity with, or a little better, than the daily average in November. Sellers say specifications indicate December will exceed November in volume, and will represent the largest December tonnage since pre-depression times.

Birmingham, Ala.—Prompt deliveries are being made to clear books

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Cr.—18%
Ni.—8%
C.—.07%
Mo.—2.5%

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of orders by Dec. 31. Spot orders continue, though not to the total of a few weeks ago, prior to the advance of $1 per ton.

Toronto, Ont.—Sales are holding at a steady level, running in excess of 800 tons per week. Melters are confining purchases to spot delivery. While a few melters have taken in lots up to 300 tons for current needs, no forward delivery contracts have been placed. Daily melt is holding at about 50 per cent. Prices are firm.

Scrap

Scrap Prices, Page 69

Pittsburgh—Scrap brokers here find difficulty covering on a recent order for No. 1 heavy melting steel at $13.75 and in some cases have paid as high as $14 against shortages, so that the market at $13.50 to $14 is as strong as at any time in the last three or four months. Railroad scrap is bringing around 50 cents a ton higher than a month ago, and the Pennsylvania, which closed Dec. 4 on a 45,000-ton list, is reported to have obtained as high as $15 a ton for part of the 23,400 tons of heavy melting steel.

Cleveland—Some new buying of heavier grades of iron and steel scrap has been resumed and shipments are fairly satisfactory on orders. Quotations have been advanced 25 to 50 cents on about a dozen grades. At Youngstown, some further buying of scrap in small lots is taking place and the market in the valleys is firmer.

Chicago—The market on heavy melting steel here is regulated largely by bids of dealers, mills deferring new buying. Sellers lowered their bids recently when a reduced flow of scrap was in prospect, now offering $13.25 to $13.75 in covering old orders. While this is a 25-cent reduction, the market remains strong and sellers are unwilling to accept additional business at $13.50, the figure ruling on the last mill purchase.

Boston—Firm prices in an active export market for scrap have steadied quotations for domestic demand, although steelmaking grades to New England consuming points are unchanged, the last paid at Worcester being $9.50 for No. 1 heavy melting steel. For export heavy melting steel grades are strong at $9.75 and $8.75, respectively. Export shipments have increased sharply, one ship taking 3000 tons of rails to Cuba. Heavy shipments have been made to Poland and Japan recently.

New York—Uncertainty prevails in the export market for steelmaking grades, some shippers being reluctant to take on more volume for Italy. What business done with Italy and other nations is at firm unchanged prices.

Philadelphia—Strength in scrap is reflected by slight advances in No. 2 heavy melting steel and stove plate. Buying is still restricted but more tonnage is moving against contracts. Edward G. Budd Mfg. Co. recently opened bids on its monthly offerings of 3500 tons of new bundled sheets and 350 tons of miscellaneous scrap.

Buffalo—There has been some additional buying of scrap at $10.75, delivered here, for No. 2 heavy melting steel. Dealers are holding No. 1 for higher prices, claiming that material can now be shipped out of the Buffalo district with all charges absorbed to greater advantages than it can be sold to local consumers.

Detroit—Advances of 25 to 50 cents a ton in important steelmaking grades confirmed a strong local scrap market undertone last week. In some cases motor lists brought 40 cents to $1 a ton over the early November sales.

Cincinnati—The iron and steel scrap market is unchanged and without new forward contracting. Dealers have readjusted their prices upward in recognition of the strong price situation.

St. Louis—Iron and steel scrap during the past week or ten days has been enlivened by the purchase by two east side mills of 10,000 to 12,000 tons of heavy melting steel for delivery over 60 days. The price is understood to have been 50 cents per ton higher than the last previous purchase by these interests. Prices are strong.

Birmingham, Ala.—A small quantity of iron and steel scrap is moving and prices hold. Sources of supply are not so abundant as a short time back and stocks on yards are showing some reduction.

Seattle — Domestic sales, principally to mills, lead the market and maintain prices. No. 1 melting steel is offered here at $10 to $10.25, gross ton, and exporting houses get LC acceptances of quotations of $13.50 to $14, c.i.f., Japanese ports.

Toronto, Ont.—Steel mills are taking large tonnages of heavy melting steel and other grades, according to local dealers. Current deliveries, however, are against contract, although some new orders are being booked.

Tin Plate

Tin Plate Prices, Page 66

Pittsburgh—Last week the average of tin plate production was at a strong 75 per cent, while operations of the leading producer were at 79 per cent. Partly because of this unusually high rate, producers still are failing to reduce stocks. Many cold

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roll mills last week were operating at close to 100 per cent due to the heavier demand for this material. The market remains $5.25 per base box, Pittsburgh, for tin plate, and 2.75c, base, Pittsburgh, for No. 28 gage tin mill black.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 67

An advance of approximately 10 per cent in the price of large size bolts, about 3 per cent on small sizes, and 10 per cent on semifinished nuts, effective immediately and for first quarter has been announced by the majority of manufacturers. No change was announced last week on hexagon cap screws or square head set screws.

The market is stronger than it has been for several months, as large specifications have come from automobile and related industries.

Emerson Electric Mfg. Co., St. Louis, is opening a branch sales office in Detroit, with headquarters in the Stormfeltz-Loveley building, Woodward and Grand boulevard.

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Warehouse

Warehouse Prices, Page 70

Pittsburgh—Sales hold up well and are featured by a sizeable volume for river barge repair work. Frick Reid Supply Co., Pittsburgh, has taken a contract for 42,259 pounds of various shapes of soft steel on a bid of $1049.73 to the Huntington, W. Va., engineers. Somers, Fitler & Todd Co., has been awarded steam hose couplings for Marietta, O., delivery on a low bid of $49.01.

Cleveland—The market is quiet, as usual at this time of the year. Warehouse business for 1935 is about 25 per cent over 1934. It has been a good year, but not an exceptionally profitable one. Cold finished bar prices will be advanced by warehouses Jan. 1.

Chicago—November sales held up unusually well, the decrease from October being slight and substantially less than normally experienced. Extension of prices into first quarter points to few, if any, changes.

New York—Volume during the last week has slipped backward, with prices unchanged. The decline has been well distributed, with structurals notably lagging. An advance in cold-finished bars is expected.

Philadelphia—While daily tonnage in local warehouse market held up fairly well through November, a decline is expected this month in view of the approaching holiday season. Prices are unchanged.

Detroit—Sales are resisting the seasonal decline and so far in December have been totaling close to the early November record. Prices are unchanged.

Cincinnati—Sales have improved in recent weeks, with no indication in any class of demand of the usual year-end recession. Recent PWA projects are resulting in some orders.

St. Louis—Business is holding up well. Purchasing by the bituminous coal mines in this area is considerably larger than at the same time a year ago.

Seattle — While prices are holding fairly well, demand eased off at the end of the month, but it is expected the first half of December will bring increased interest.

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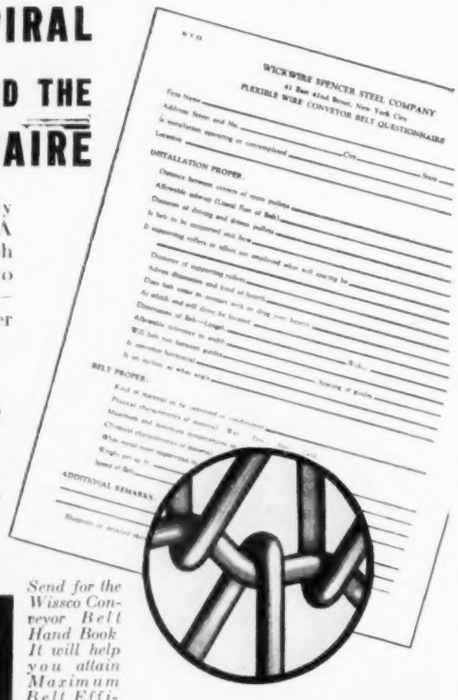

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Iron Ore

Iron Ore Prices, Page 69

Cleveland — Vessel shipments of Lake Superior iron ore have been

concluded for the season, with the November movement amounting to 1,557,494 tons, compared with 1,073,303 tons in November last year. The total for 1935 is 28,362,368 tons, 27.47 per cent more than in 1934. Tonnages moved from the respective upper lake ports follow:

	1934	1935
Escanaba	1,543,737	1,823,655
Marquette	2,207,566	2,963,603
Ashland	2,286,766	3,068,784
Superior	6,996,206	10,276,176
Duluth	6,015,630	6,995,979
Two Harbors	3,199,695	3,234,171
	22,249,600	28,362,368

Comparisons with other seasons:

	Tons		Tons
1926	58,537,855	1931	23,467,786
1927	51,107,136	1932	3,567,985
1928	53,980,874	1933	21,623,898
1929	65,204,600	1934	22,249,600
1930	46,582,982	1935	28,362,368

Steel in Europe

Foreign Steel Prices, Page 70

London — (*By Cable*) — Some decrease is reported in activity in the iron markets of Great Britain, as usual toward the end of the year. Pig iron producers are not eager to book business beyond March, 1936, as a rise in the price of hematite pig iron is possible, owing to increasing costs. Some tonnages of hematite iron have been shipped to Belgium, Germany and Denmark. Activity continues in shipbuilding and construction.

Export trade from Continental markets is good, especially to other European countries. Germany is exporting mainly sheet bars and beams.

Nonferrous Metals

Nonferrous Metal Prices, Page 68

New York — Copper displayed strength last week while steadiness ruled other major domestic nonferrous metals. Shipments to consumers held at a steady pace and a further improvement in the statistical position was realized.

Copper — While some members of the trade still look for a ¼-cent advance after the middle of the month, depending on domestic buying and developments in the foreign market, sales last week did not warrant an advance. All first-hands continued to quote electrolytic at 9.25c, Connecticut.

Tin — Tin prices declined gradually during last week to around 51.00c for Straits spot as consumers anticipated an increase in export quotas and withheld purchases. This action by the International Tin committee was taken Friday with the announcement that quotas for the first quarter of 1936 would be raised 10 points to 90 per cent.

Zinc — Although sales were light, prices held firm at 4.85c, East St. Louis, for prime western, principally on the steady improvement in metal's statistical position.

Lead — Shipments to consumers maintained an active pace while new bookings held satisfactory.

Antimony — Chinese antimony prices were nominally unchanged at 14.75c, duty paid New York, but supplies were scarce. American spot antimony declined to 14.12½c, New York.

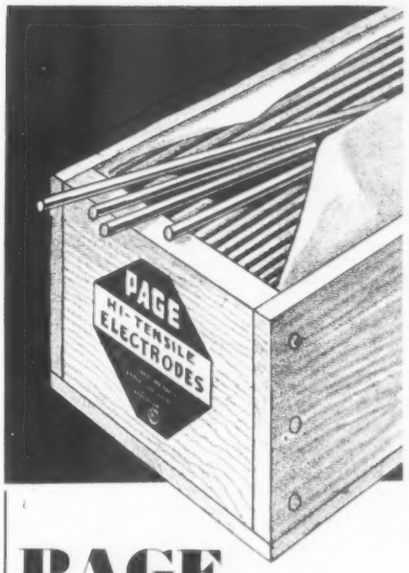
Equipment

Chicago—Markets for plant equipment continue relatively active, particularly as regards machine tools and foundry equipment. A feature of the former is the appearance of inquiries from railroads for 1936 budgetmaking purposes. For several years railroads have not asked for prices, and the present move is taken as an indication that machine tool purchases in that direction will be heavier next year.

Boston—Machine tool builders in some instances are experiencing delays in delivery of parts. Most of the larger shops in New England are operating full-time schedules and delivery periods have been further advanced. Purchases are being made by railroads in some instances, builders report. Additional navy business reported this week as having been awarded includes contracts to the following New England builders: Jones & Lamson Mfg. Co., Heald Machine Co. and Brown & Sharpe Mfg. Co.

Pittsburgh—Youngstown Sheet & Tube Co. has awarded a contract to the Surface Combustion Corp., Toledo, O., for the construction of a third slab heating furnace for its 79-inch continuous hot mill. The furnace will increase capacity of the new hot mill about 25 per cent from 50,000 to 65,000 tons a month. Carnegie-Illinois Steel Corp. has completed construction of its new 43-inch continuous strip mill at McDonald, O., and has started operations. The mill will produce strip steel up to 37 inches wide and in thickness ranging from 18 gage to ⅜-inch. Monthly capacity is stated at 30,000 tons.

Seattle—Inquiry has increased for marine machinery and equipment as fishing vessel owners prepare to place the usual winter construction jobs. Mining and lumbering are less active due to seasonal conditions. As a whole turnover of equipment and machinery is almost equal to the year's best levels.



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STEEL AND WIRE PAGE QUALITY PRODUCTS
WELDING ELECTRODES

Construction and Enterprise

Ohio

CLEVELAND — Cleveland Graphite Bronze Co., 880 East Seventy-second street, has taken over 30,000 additional square feet of factory space, covering about half of the ground floor space in the Columbia Axle Co. plant which is adjacent to the Graphite plant. The newly acquired space is now being equipped.

COLUMBUS, O. — Guenther Foundry Co. has been incorporated by John C. Guenther, Robert G. Walters, Elsa Dorathea, Lytle Tuber, 43 West Town street.

DAYTON, O.—Air Corps, materiel division, contracting officer, Wright field, asks bids Dec. 20 for aluminum alloy bar, rod, sheet tubing, ingot, and welding rod; Dec. 18, connection assemblies; Dec. 13, gage-assembly-pressure-landing gear.

NEW WASHINGTON, O. — Bremer Aluminum Corp. has been established here to engage in the manufacture and distribution of aluminum products. W. S. Bremer, A. L. Lea, and V. S. Heydinger were the organizers.

ZANESVILLE, O. — Remodeling of the old Malleable Iron Co. plant in lower Putnam, O. under a project of the WPA has been assured through formal announcement from Comptroller General McCarl to local WPA officials. The federal government is releasing $50,000 for the project, and $30,000 is to be raised by the city administration, Chamber of Commerce, and citizens, with work to get under way within the next few weeks. When completed the plant will be turned over to the Rubin Brothers Footwear Inc. as a second unit in their local manufacturing enterprise.

Michigan

DETROIT — American Twist Drill & Tool Co., 2804 Jefferson avenue, west, having outgrown its present location, has started the erection of a new plant on a 150 x 400 foot site at Chicago boulevard, west, and Freeland avenue. Its completion is scheduled for the middle of next January. Claire W. Ditchy, Detroit architect, is designer of the building.

KALAMAZOO, MICH. — Allen Electric Co. plans through Stewart-Kingscott Co., owner, to construct addition to plant at a cost of $28,000 or more.

KALAMAZOO, MICH. — Petition for dissolution of the Reed Foundry & Machine Co. has been filed in circuit court by a majority of the board of directors including Ralph M. Fisher, Joseph E. Brown, A. J. Woodhams, and E. H. Smith.

PORT HURON, MICH. — Mueller Brass Co. will start at once to reconstruct an old building into a new unit to permit extension of melting and casting work. The new unit is 49.6 x 64 feet and is being built of steel and concrete in a manner to permit further expansion. $11,500 will be spent on the building and $11,000 for new equipment, according to Oscar B. Mueller, president of the company.

New York

ELMIRA, N. Y. — Elmira Precision Tool Corp. has been incorporated to deal in realty and merchandise, by DeForest E. Fox, 1218 West Water street, James E. Personius, 951 Farnham street, and William P. Rodgers, 615 Penna avenue.

NEW YORK — United Maintenance Corp., Manhattan, has been incorporated, to deal in stoves and furnaces, by B. Robbins, 25 Warren street, New York.

OSSINING, N. Y. — Cambridge Instrument Co., Spring street, is now making preliminary plans for construction of a $25,000 addition. H. N. Packard is manager and bids for the work will be called for within a few weeks. The addition will be a 3-story brick and steel structure which will house the offices of the company, as well as some of the delicate machinery used in the construction of surgical and scientific apparatus.

SCHENECTADY, N. Y. — General Electric Co. will build a second 36,000-kilowatt generator, costing $415,000, for Wheeler dam on the Tennessee river.

Pennsylvania

BEAVER FALLS, PA. — Oil Equipment Mfg. Co. has been granted a Pennsylvania state charter with stated capital of $50,000, to manufacture fluid measuring devices, by Lyon McCandless, Clifford H. Beegle, and Wesley P. Baum.

PITCAIRN, PA. — Getting ready to do its share in the Pennsylvania railroad's new $30,000,000 equipment program, the car-building department started work here on a new machine shop which will be more than 100 feet long and 50 feet wide. It will replace an older structure which burned down last summer, and will be constructed largely of steel. Construction of 10,000 new freight cars was recently authorized by the railroad and a large proportion of them will be built in this city. In addition to being used for manufacture of the new cars, the machine shop will be utilized in the repair of older rolling stock.

READING, PA. — The pipe mill of the Reading Iron Co. was damaged by fire recently, the origin of the fire being in a 750-gallon oil tank.

Massachusetts

BOSTON — Bay State Auto Radiator & Body Works Inc. has been incorporated by Abraham Cherney, Harry Cherney, and Marion Sylvia Cherney, all of Brookline, Mass.

CHICOPEE, MASS. — Hampden Brewing Co., North Chicopee, Mass., proposes to build a 3-story, 60 x 133 foot, brick and steel plant addition, with cost to exceed $100,000. McClintock & Craig, 458 Bridge street, Springfield, Mass., is architect.

District of Columbia

WASHINGTON — Proposals for contracts 91-S and 92-S will be received at the office of the Washington suburban sanitary commission, Tower building, Fourteenth and K streets, northwest, on Dec. 11 for constructing approximately 19,000 feet of 30, 36 and 42-inch cast iron or reinforced concrete pipe sewers. Plans and specifications may be received from the office of Chief Engineer, Washington suburban sanitary district, Hyattsville, Md.

WASHINGTON — Bureau of supplies and accounts, navy department, asks bids for miscellaneous submarine escape apparatus Dec. 10, schedule No. 6583, with delivery to be to Sewall's Point, Va.; miscellaneous flexible steel cable, Dec. 13, schedule No. 6585; miscellaneous wrought, bar, iron, Dec. 13, schedule No. 6589, with delivery to Washington; miscellaneous plate, sheet, and slab zinc, Dec. 17, schedule No. 6593.

WASHINGTON — Bureau of supplies and accounts, navy department, asks bids for one steel ferryboat, Dec. 17, schedule No. 6568, with delivery to be to navy yard on Atlantic coast; 300 pressure, manifold, aircraft gages, Dec. 13, schedule No. 6572; miscellaneous engine gage, aircraft, units, Dec. 13, schedule No. 6575, with delivery to be to Philadelphia; miscellaneous ferromanganese, Dec. 10, schedule No. 6581.

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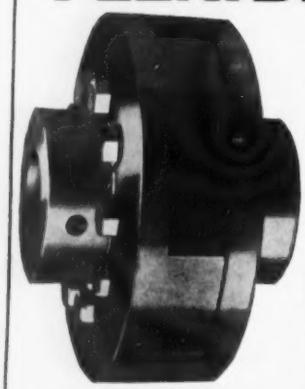

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plies and accounts, navy department, asks bids for miscellaneous copper seamless tubing, Dec. 10, under schedule No. 6535; miscellaneous twist, carbon, and high speed drills, Dec. 10 under schedule No. 6554; miscellaneous aluminum alloy, Dec. 13, schedule No. 6556; 15,000 pounds of nickel-chromium-alloy rod, Dec. 10, schedule No. 6560, with delivery to be to Mare Island, Calif.; miscellaneous electric insulated cable, Dec. 13, schedule No. 6564.

Wisconsin

BELOIT, WIS. — X-Ray Quality Inc. has been organized to manufacture X-ray tubes under development for two years by Louis A. M. Phelan and associates. Industrial applications will be emphasized although equipment will also be made for laboratory and hospital use.

CHILTON, WIS. — New London Construction Co. is successful bidder for building new county highway garage and service shop, costing $52,312, compared with PWA estimate of $64,000.

MILWAUKEE — Fire of unknown origin caused severe damage in the plant of the Robinson Plating Works at 820 West Winnebago street on Dec. 1. New quarters will be secured at once.

MILWAUKEE — Metal Spraying Corp., 3132 West Garfield avenue, has leased new and larger quarters at 3610 West Pierce street. It was organized in June, 1934, and already has outgrown the original shop. P. G. Dennison is manager.

MILWAUKEE — Briggs & Stratton Corp., 2711 North 13th street, manufacturer of auto accessories, has purchased idle plant of Westinghouse Lamp Co. and will begin production there of its heavier lines, using its present plant only for light operations. Newly-acquired plant contains 225,000 square feet and is assessed at $415,000. Charles L. Coughlin is president.

NEENAH-MENASHA, WIS. — Neenah-Menasha sewerage commission has selected the consulting engineering firm of Greeley & Hanson, 6 South Michigan avenue, Chicago, to handle the new sewage treatment and collection main system estimated to cost $1,052,940 as a PWA project.

RACINE, WIS. — Iroquois Foundry Co. plans extensive alterations and remodeling to its 1-story 100 x 280 foot factory. J. W. Hammes is architect.

RACINE, WIS. — Hamilton-Beach Mfg. Co., manufacturer of fractional horsepower motors and appliances, will build a 3-story addition, 90 x 150 feet, costing about $85,000 with equipment. The company is a subsidiary of the Scovill Mfg. Co., Waterbury, Conn., and T. B. Myers is vice president in charge of the western division at Racine.

SUPERIOR, WIS. — Lee Kittredge Batteries Inc. has been incorporated to manufacture batteries by Lee Kittredge, Gerald B. Crawford, and R. A. Crawford.

WAUKESHA, WIS. — Mascot Mfg. Co., Bluffton, Ind., has arranged to move its shop to Waukesha and have advantage of facilities of the Alloy Products Co. in manufacturing mechanical stokers. R. C. Reynolds owns the Mascot firm.

Iowa

BETTENDORF, IOWA — Crawford-Blair Mfg. Co. has been incorporated to manufacture farm equipment. R. F. Crawford, Rock Island, Ill., is president.

DES MOINES, IOWA — National Mfg. & Stamping Co., Harry B. Meredith president, manufacturer of stock tanks, hog waterers and seed corn testers, has moved its factory operations from the old plant at 102 Southeast Fifth street, to larger quarters in the former Klondike Incubator factory, 2425 Dean avenue.

FAIRFIELD, IOWA — Dexter Co., manufacturer of washing machines and ironers, is constructing a 1-story boiler and cold storage room building, 40 x 85 feet, and will install new boiler and auxiliary equipment. Extensive repairs and remodeling is also being done to the factory which was badly damaged by a severe windstorm last July.

KEOKUK, IOWA — City voted for the establishment of a municipal waterworks system by purchase of existing system or construction of a new system, with cost not to exceed $848,457. A PWA grant of $694,191 has been applied for. Total cost is $1,542,648. C. J. Nelson is city engineer.

Minnesota

MINNEAPOLIS — White Labeling Machine Co. has been incorporated to manufacture labeling machines of vari-

(*Please turn to Page* 89)

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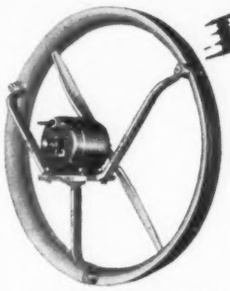

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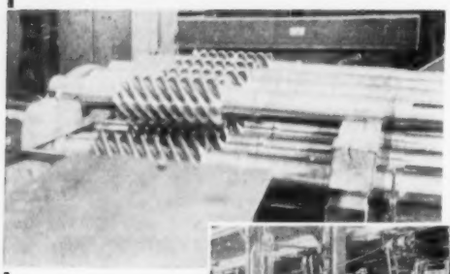

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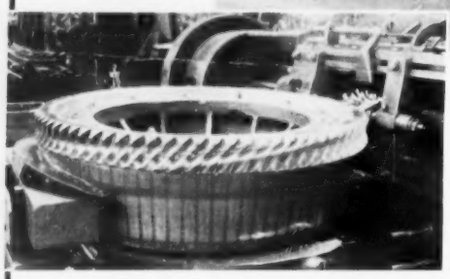

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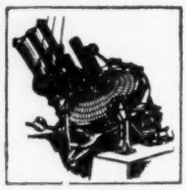

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(Concluded from Page 87)

ous types, by Warren J. Hopwood, Malcolm W. White, and A. R. Chesnut.

MINNEAPOLIS — Ceomatic Co. has been incorporated to manufacture cabinet work, etc., by A. J. Holenstein, Paul H. Moran, A. Hanson, Henry E. Moran, and F. Hills.

MINNEAPOLIS — Perfection Mfg. Co., 2125 East Hennepin avenue, has been incorporated to manufacture milking machines, rotary pumps, etc., by Henry W. Haverstock, John H. Farley, and Edwin L. Strand.

South Dakota

ARMOUR, S. DAK. — Northwestern Public Service Co., Huron, S. Dak., will soon start construction of a power plant to cost $125,000 with equipment. O. C. Stokke, Huron, is engineer. Walter J. Dixon, Woelfel building, Mitchell, S. Dak., is architect.

Nebraska

SUTTON, NEBR. — A night fire destroyed the municipal power plant here with a loss of $100,000.

Montana

HELENA, MONT. — Bids for construction of school additions and new buildings, totaling nearly $400,000 have been called as follows: Joplin, Mont., Dec. 11, $24,000; Eureka, Mont., Dec. 12, $100,000. The projects include heating plants, boilers, steel lockers, and other steel equipment.

Florida

LEESBURG, FLA. — City, Wylie W. Gillespie, Box 131, Tavares, Fla., receives bids Dec. 12 for constructing sanitary sewers. W. Austin Smith, Jacksonville, Fla., is consulting engineer.

PENSACOLA, FLA. — City, George J. Roark city manager, receives bids Dec. 14 for furnishing materials, labor, and constructing two sewage disposal plants, consisting of clarifiers, sludge digestion tanks, sludge drying beds, screen chambers and other appurtenances; 814 feet of 20-inch and 24-inch outfall sewer and about 3000 feet of 4-inch cast iron pipeline. Wiedemann & Singleton, Atlanta, Ga., is engineer. City has also received a PWA grant of $11,500 for improvements to waterworks plant, including the installation of an aerator to purify the water and the sinking of a water well at the plant. Work will start as soon as money is available.

Tennessee

MEMPHIS, TENN.—City commission signed a 20-year contract with the Tennessee Valley Authority for building transmission lines into the city, when the city commission has worked out plans for either purchasing or building distribution system. City recently voted $9,000,000 bonds for construction of a power system.

WHITE PINE, TENN. — J. C. Biddle, recorder, will receive bids Dec. 11 for the construction of a waterworks system in this town. PWA loan and grant has been secured. Campbell Wallace, 605 Empire building, Knoxville, Tenn., is engineer, and Y. R. Williams is mayor.

West Virginia

BLUEFIELD, W. VA.—City has invited bids for the construction of sanitary sewer system, including lines, sewage disposal plants, etc. PWA allotment for completed project is $443,636. Morris Knowles Inc., Pittsburgh, is engineer.

Virginia

BLACKSBURG, VA. — Bids will be opened Dec. 12 for construction of an armory. Smithey & Boynton, Roanoke, Va., is architect.

FRONT ROYAL, VA. — City receives bids Dec. 10 for waterworks extension, filter plant and electric light extensions. J. L. Meen is engineer.

RICHMOND, VA.—Electrical Equipment Co., 324 South Fifth street, wants prices and data on a generator set, 750 kilowatts, 150-pound pressure with 3-pound back pressure; fourteen motors; Two 20 horsepower, two 5 horsepower, two 15 horsepower, five 7½ horsepower, and three 1 horsepower.

Missouri

ST. LOUIS — Bids will be asked Dec. 13 by board of public service, city hall, for construction of 9 miles of 5 foot steel water pipe line from Howard's Bend waterworks plant, Missouri river at Hine, to Stacey Park reservoir, St. Louis county. Cost is $820,000.

Texas

EDINBURG, TEX. — Hidalgo county water control and improvement district No. 1 opens bids Dec. 14 for construction of irrigation system improvements. Plans and specifications may be obtained from Henry Heinemann president. A PWA project, A. J. Moore is engineer, and A. Pamm is consulting engineer.

PECAN GAP, TEX. — City secretary, Mayor H. T. Shipman, opens bids Dec. 10 for construction of a waterworks system. Plans and specifications are held by Joe J. Rady, 410 Majestic building, Fort Worth, Tex., and the estimated cost of project is $31,500.

ROXTON, TEX. — Lamar county water control and improvement district No. 1 receives bids Dec. 14 for constructing a water distribution system. Hawley, Freese, & Nichols, Capps building, Fort Worth, Tex., is engineer.

WACO, TEX. — City, Joe. W. Hale mayor, opens bids Dec. 12 for the construction of stadium. T. Brooke Pearson, 115 North Twelfth street, is architect.

Pacific Coast

ANTIOCH, CALIF.—City has proposed that a replacement be made in the pipe line from municipal waterworks to the reservoir, constructing a new suction line from waterworks to intake in San Joaquin river, and installing an electrically-driven pump. Cost is $88,000 and an $87,272 PWA loan and grant will be secured. G. Oliver is city engineer.

CROCKETT, CALIF.—East bay municipal utility district, 512 Sixteenth street, Oakland, Calif., is preparing plans for a steel storage tank.

LOS ANGELES—W. F. Rockwell, president of the Timken Detroit Axle Co., is considering plans for removal of the Pacific headquarters of the company from Oakland, Calif., to Los Angeles.

LOS ANGELES—Western Washer & Mfg. Co. has purchased a ground area of 20,000 square feet with a building, on Fifty-first street between Alameda and Santa Fe avenue. Extensive improvements have been made for the purpose of manufacturing standard and special cut washers and metal stampings. Equipment is being installed. In addition to the variety of washers manufactured out of ferrous and nonferrous metals, the company represents as sales agents the Wrought Washer Mfg. Co., Milwaukee. Owners of the Western company are A. E. Nygreen and A. E. Johnson.

OAKLAND, CALIF.—Supply officer, forest service, Government island, is taking bids for 100 miles of No. 12 AWG copper covered steel phone line wire.

SAN DIEGO, CALIF.—Approval has been made on the city plan for a waterworks improvement, including the laying of 12,200 feet of pipe, section 1, from Pacific boulevard to Rosencranz street, and 2600 feet of cast iron. WPA portion is $17,425 and city portion is $7485. H. W. Jorgenson, city hall, is engineer.

SAN FRANCISCO—Specifications are being completed for the construction of a chlorinating plant with piping. Engineering department of public utilities commssion, 425 Mason street, is engineer.

SANTA MONICA, CALIF.—Douglas Aircraft Co., 3000 Ocean Park boulevard, is making plans through E. C. Taylor, 803 West Third street, Los Angeles, for a 200 x 300-foot aircraft factory with cost to exceed $28,500. Ask bids soon for structural steel for same. E. W. Taylor, 803 West Third street, Los Angeles, is engineer.

YREKA, CALIF.—Yreka Railway Co., J. P. Yates president, Los Angeles, and V. A. Gualanao, executive vice president and general manager, Yreka, plans laying 3½ miles 75 pound steel replacing 40 pound rail now in use, and placing 8000 new track ties on Yreka-Montague line. O. G. Steele is receiver for the company.

SEATTLE—C. M. Ambrose Co., White-Henry-Stuart building, has been incorporated by C. M. Ambrose and associates, to deal in machinery and accessories.

SEATTLE—Elmer E. Hemrich Brewery Inc., recently organized has acquired the former Continental Can Co. plant on Ninth avenue south, and announces expenditure of $200,000 for remodeling and new equipment. Plans are being prepared by Erwin Weber, Medical Arts building, engineer.

WENATCHEE, WASH.—Town is making plans to pump water from Columbia river. H. Isler, city hall, is engineer and is preparing estimated cost of installing diesel motors to generate power for pumping.

Dominion of Canada

WINNIPEG, MAN. — G. F. Bentley, city engineer, will soon take bids for single track subway, including laying underground electric cable at St. James. Cost is $281,000.

TORONTO, ONT. — Construction of a $6,000,000 addition to the smelter of the International Nickel Co. of Canada at Copper Cliff in northern Ontario has been announced through the company's head office by Robert C. Stanley, president. The addition will be completed in about a year, and the expansion has been made to increase reserve capacity.

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